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MEDICAL EDUCATION IN THE UNITED STATES: WITH SOME REFLEXIONS ON THE FUTURE IN AUSTRALIA.[1]

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INTRODUCTION.

SINCE the war several papers on particular aspects of medical work in the United States have been published in Australia, but none, so far as I am aware, deals solely with medical education. For that reason, and in relation to the many recent British reports on the subject, it is felt that these observations may be of interest.

This work does not purport to be exhaustive; more detailed recent surveys are available in the studies by Dolman (1946) and by Anderson and Tipner (1949). The present observations were compiled during a five weeks' tour, which embraced 13 medical schools—one yet in embryo—directly, and five others—two of them Canadian—indirectly by correspondence or by conversation with a member of the staff. At the outset, those visited directly were taken as they came and constitute a fairly random sample; later, because of restriction of time, selection was exercised in favour of schools notable for some educational experiment or some educational authority, and these cannot be considered a random sample. In each case the dean or his representative was interviewed on matters of local educational policy and administration; then, as opportunity afforded, some aspects of the work in medical school or hospital were observed as illustrations of the principles discussed. Also, good fortune brought contact with a number of people who, while independent of medical schools, were in a position to make authoritative pronouncements on medical education.

In the United States—as elsewhere—the object is, naturally, to produce the best doctors possible in the time available. Most educationalists are fully seized of the importance of the dictum that "the problem of medical education is a problem of education, not of medicine", and although there is inevitable pressure from the clinical teachers to encroach upon the time allotted to the basic sciences the balance is on the whole fairly evenly preserved. There is another problem: no matter how excellent the doctor may be *qua* doctor, his education is incomplete if he cannot assume towards education as a whole and the community in particular the responsibilities proper to a person who has enjoyed one of the longest and most expensive university courses, and will occupy a position of authority and respect in the community. Here it can be said that in the United States every effort is being made to improve medical education from all points of view. There is little self-complacency; on the contrary, education is being treated like any other subject amenable to scientific analysis, and experiments are continually in progress. At the present time a committee appointed jointly by the Council on Medical Education and Hospitals of the American Medical Association and the Association of American Medical Colleges, under the charge of Dr. John Dietrich, is conducting a survey of all the medical schools in the United States; Western Reserve has just appointed Dr. Hale Ham to study and revise its whole curriculum; the Colorado School of Medicine has recently produced a training programme designed specifically for the needs of a predominantly rural population; New York University is replanning its whole organization—physical and social—largely under the inspiration of Dr. Donal Sheehan. Nor

[1] The visit upon which these observations were made was financed by a University of Adelaide Study Leave grant and by a grant-in-aid from the Rockefeller Foundation.

is this zeal restricted to medicine, for such a "technical" body as the Massachusetts Institute of Technology has lately issued a compendious report, with recommendations for improvement of its courses on the educational, or "cultural", side.[1]

General Educational Background.

The general educational background is particularly important from the "cultural" point of view, since what is learnt in childhood and adolescence generally determines the major attitude towards life and the community ever after. In most European countries the requirements for university entrance are quite stringent, and a reasonable educational background may be presumed with fair confidence (Flexner, 1925). The British system makes the same assumption, but university entrance is easier, and the increasing technical content of the medical curriculum has so reduced the time available for "broader" interests that the fallacy of the assumption is becoming increasingly apparent. Consequently, almost every report on the curriculum draws attention to the necessity for extending "cultural" opportunities (Goodenough, 1944; General Medical Council, 1947; British Medical Association, 1950, *et cetera*).

In the United States the average student entering upon the medical course has the following educational background: eight years in grammar (primary) school, four years at high school, and three or four years in college. As far as could be gathered from limited discussions with educationalists, the curriculum pursued at each epoch is broader than that found under the British system, but the standard attained in any one subject at a particular age is rather lower. The influence of the medical curriculum may extend right down to the high school course by prescribing prerequisites for the pre-medical college curriculum.

The college curriculum, while nominally a general arts or science course, must include the usual medical prerequisites such as chemistry, physics and biology. Other subjects depend upon the nature of the course and include English, a foreign language, mathematics and American history and institutions. A number of elective (that is, optional) courses are required to complete the programme, and among those recommended to intending medical students are psychology, biostatistics and public health. An interesting inclusion is military or naval science. Military science may be compulsory (University of California) or optional (University of Michigan). The course in naval science must be accompanied by astronomy. After three successful years on such a curriculum the student has usually acquired sufficient credits to qualify for admission to a medical school, and the majority apply for entrance at that stage, even though most medical schools recommend completion of the four years required for the bachelor's degree.

It will be noted that the preliminary college course does, on the surface, cater for the "cultural" as well as the pre-medical side of the medical course—at least, it appears to make a greater effort towards general education than the British system. On the other hand doubts have been expressed by American educationalists on the extent to which the "cultural" objective is attained. Flexner (1925) pointed out that the American colleges vary quite a lot in quality, and reached only the same standard as the British student's matriculation *plus* first-year medicine. The colleges may have changed since then, but some modern educationalists (in private conversation) questioned the value of the system. In their opinion the "cultural" subjects are largely forgotten once the examinations are passed, and they expressed the view that it would be better if the medical schools took over at least the pre-medical subjects of the college course. It might be added here that while English and other languages, philosophy and psychology, economics, geography, history and so on are traditionally associated with "culture", they do not of themselves confer "culture". Only a limited number of minds can be expected to acquire a truly cultured outlook, and such minds will acquire that outlook from the most technical of subjects, provided that it is taught properly as a course in education and not merely as a course of instruction.

Admission to Medical Schools.

Most medical schools will admit students who have completed a satisfactory three years in college. Six schools —Georgetown, Johns Hopkins, Tufts, Vanderbilt, Kansas and Laval—demand a bachelor's degree; many other prefer it, and, in fact, nearly half the students doing the first year possess such a degree. On the other hand many schools will accept a satisfactory first year's work in medicine as completing the requirements for the bachelor's degree.

There are 71 medical schools and seven basic science schools in the United States (Anderson and Tipner, 1949). The basic science schools are those which can cover the teaching ground for the first two years' work but lack facilities for clinical teaching—their students must go elsewhere for this. In 1949 there were nearly 7000 vacancies for first-year students in all these schools, but there were something like 24,000 qualified applicants. Aware of the difficulty of gaining admission most candidates send applications to a number of medical schools (despite the $5.00 "processing" fee charged in each case), so that the total number to be dealt with is very great—estimates range from 50,000 to 80,000 *per annum*.

Rather less than half of the American medical schools are State or municipally controlled, the remainder are privately owned. This difference has a bearing on the policy towards admissions. State and municipal schools are becoming increasingly reluctant to spend taxpayers' money on training people from other States, and the number of non-resident admissions to such institutions has fallen from over 17% before the recent war to just over 8% at present. Further, in such State institutions as were visited, non-resident tuition fees were considerably higher —even double those charged to State residents. On the other hand, the ordinary State fees are only about half the private fees. Despite their high charges, however, private schools suffer no dearth of applicants for admission. Indeed, since the policy of the State schools is well known, the private schools usually have many more to deal with, so that a school with, say, 80 vacancies may have to "process" over 3000 applications. The advantages of such a wide range of choice are obvious: selection is rigorous, and in the outcome anything up to a half of those admitted will be from other States.

It has been estimated (*Life*, June 12, 1950, page 37) that the medical profession in the United States has a deficiency in numbers of some 42,000, greatest in rural areas and in public health fields. The number of graduates for 1950 was forecast at 5600. Ten States have no medical school—mostly because of sparseness of population—while the existing schools must provide also for such American responsibilities as Alaska, Hawaii, the Canal Zone, Puerto Rico, and the Virgin Islands, as well as for the civil and armed services. Despite the growing demands for medical graduates there has been little change in the number of candidates admitted to the first year of medicine during the past twenty years. There was, indeed, a substantial drop in the years 1936-1941; moreover, the wastage over the four years' medical course amounts to some 1500, or 25% of the initial enrolment (figures from Anderson and Tipner, 1949).

There has been no significant increase in teaching facilities since the war, but some steps are being taken in that direction. The University of Washington School of Medicine is just completing its first full medical course; Mississippi, North Carolina and West Virginia contemplate expanding existing basic science schools to full medical schools; Florida and New Jersey are considering the establishment of medical schools; and the University of California in Los Angeles (UCLA) is building a medical school and hospital which, it is hoped, will be able to admit 50 students in 1952 and 100 students at an unspecified

[1] I owe my copy of this report to the kindness of the President of the Massachusetts Institute of Technology, but, unfortunately, cannot quote any of the contents since the report is marked "Confidential—Not for Publication".

later date. The State of New York is taking over two private medical schools—Syracuse University College of Medicine and Long Island College of Medicine—in the hope of expanding the teaching facilities, and the Southwestern Medical College has become a branch of the University of Texas—but whether or not with the object of increasing admissions was not ascertained.

It will be observed that the increasing demand for medical vacancies is to be met primarily by the provision of new facilities and to only a minor extent by expanding existing ones. Many universities are rebuilding, or propose rebuilding, their medical schools or hospitals or both, but there is no hint of any notable increase in vacancies. There is, in fact, strong opinion against the temptation to enlarge the number of entrants and so impair the staff:student ratio and the standards of teaching. At present the largest school (Illinois) admits 165 into first year, the smallest (Vermont) 40; the mean seems to lie around 80.

The practical outcome of all this is that it will be a long time before the number of vacancies equals the number of qualified applicants. In the meantime, many prospective medical students are driven to extreme measures in their efforts to realize their ambition. Not content with multiple applications within the United States, students are applying for admission anywhere that they think hopeful—Canada, Britain, Australia, New Zealand, the Continent and South America. There are, it is said, 12,000 citizens of the United States taking courses at the University of Mexico City—but not all in medicine, of course.

THE MEDICAL COURSE.

It is impossible in an article of this sort to provide an adequate analysis of the courses provided in all the different medical schools—even were the data available. The basic problems of medical education are the same the world over, and the number of possible solutions so far discovered is strictly limited. Thus, while the courses offered by medical schools in the United States vary considerably in detail, the over-all pattern is sufficiently constant to provide a reasonably representative picture.

The medical course proper covers four academic years, and in the majority of cases the M.D. degree is conferred at the satisfactory completion of this course. Six medical schools, however, require in addition a year's internship before admission to graduation, while another exacts an undertaking that such experience will be sought. In some cases one or two years' full-time laboratory work is accepted instead of the internship.

The working year may be subdivided chronologically into three terms or trimesters, or into four quarters—the summer quarter being counted as one. Or the subdivision may be on a more functional basis into two semesters of sixteen or seventeen weeks each. In any case, a summer session may be included. The average working day starts at 8 or 8.30 a.m. and goes to 5 or 5.30 p.m. with an hour's break for lunch. On Saturday work ceases at midday. Representative timetables indicate that apart from the lunch-hour break there is little unoccupied time, and what is nominally free may be taken up with electives. Because of the intense competition for places, students are fully aware of their good fortune in securing admission. They are equally aware of the probable serious consequences of social or academic lapse, and disciplinary problems appear to be minimal. This, allied to the general capacity for hard work in America, produces an atmosphere of intense activity. In return the students have the advantages of abundance of material and much more individual instruction than is found elsewhere.

Preclinical Years.

The first (freshman) year covers the usual preclinical sciences of anatomy, physiology and biochemistry. Under the semester system anatomy in all its branches may occupy the whole of the first semester; physiology and biochemistry are taken during the second semester. Under the trimester or quarter system anatomy usually overlaps physiology or biochemistry during the second term. Attention is generally directed to clinical applications in all these subjects. The second (sophomore) year is also mainly devoted to basic science, comprising pathology, bacteriology and hygiene, pharmacology and possibly some more physiology, but it usually includes introductory courses in pædiatrics and psychiatry, and in laboratory and physical diagnosis in medicine, surgery, and obstetrics and gynæcology. In addition, elective courses—usually involving additional work in one or other of the basic sciences, but also including such subjects as anthropology, medical history, medical artistry or military medicine—are offered. A minimum number of hours of elective work is compulsory, but the nature of the work is optional. The student's choice in electives may very well determine his future career.

At the end of the second year the student decides whether he will complete the medical course or pursue a career in science. If he determines upon science he continues his work in one or other of the basic sciences and finally presents a thesis for the Ph.D. degree. Such graduates find ready employment in university posts or in government and commercial laboratories. In some cases it is possible to compromise and do additional work for a bachelor's or master's degree in science without abandoning medicine. In any case, the academically-minded medical graduate may still qualify later for the Ph.D. degree.

Clinical Years and Graduation.

The third (junior) and fourth (senior) years of the medical course proper are devoted to clinical work. The subjects taken are those found in the final three years of British schools, but there is a greater tendency to apply the basic sciences to clinical problems, as well as greater emphasis upon the laboratory. Clinico-pathological conferences form a common method of teaching, and psychiatry in particular receives considerable attention. Of course, each medical school handles its problems according to its own ideas and special facilities, but on the whole the pattern is fairly uniform. Some elective hours in clinical work are expected in addition. Military medicine may be offered as an elective, and a successful course in this subject admits automatically to the reserve of officers upon graduation. Graduation usually depends upon accumulation of the required number of credits, satisfactory behaviour throughout the course and completion of the necessary examinations. As already mentioned, some medical schools demand a year's internship before they admit their students to the M.D. degree.

Internships.

Internships are of three kinds—straight, rotating and mixed. A straight internship involves twelve months' work in one department only and is usually the objective of the intending specialist. A rotating internship demands one month in each of twelve departments. A mixed internship implies three months in each of four major departments —for example, medicine, surgery, gynæcology and obstetrics, and pædiatrics.

Licence to Practise.

Licence to practise medicine in any of the United States or their territories is normally determined by the State Board of Medical Examiners—the possesion of an M.D. diploma does not in itself confer the right. After graduation and completion of certain requirements the candidate must pass the examination set by the State board before he is permitted to practise. Twenty-five States and five territories demand an internship—in fourteen cases one year's, in one case two years' rotating service—as a prerequisite to registration. Strictly, the State board examination confers the right to practise only in that State, but several, or most, States and territories have reciprocal arrangements with some or many others, including, in some cases, Canada. Some States prefer a basic sciences examination, as that helps to exclude practitioners of the more exotic semi-medical cults, whose training did not include a course in the basic sciences. The National Board of Medical Examiners offers a more widely recognized licensure. To

qualify, the candidate must pass three examinations—one on the preclinical subjects (which may be taken at the end of second year), one on clinical subjects (after completing fourth year), and an oral and practical examination after completion of internship and graduation. This is both more expensive and more exacting than the State registration, but it is recognized by 45 States and three territories. It is also accepted for admission to the final examination for the conjoint qualification in England, the triple qualification in Scotland, and the conjoint qualification in Ireland.

Barely half the States and territories demand a period of internship before registration. In the other States the graduate could, presumably, proceed straight into practice. In fact, however, more than 99% of medical graduates voluntarily serve at least one year's internship, and the majority take at least one extra year (Anderson and Tipner, 1949). The number of internships available in the teaching hospitals is, of course, limited, but the value of interns to the running of a hospital is now widely recognized, and a great many non-teaching hospitals offer internships. Consequently, there are something like 9000 vacancies available to some 6000 medical graduates. Competition is keen, and teaching hospitals, which formerly offered only board, residence and laundry, must now pay $25.00 a month or more as well; non-teaching hospitals offer up to $300.00 per month for their interns.

The next grade above internship is a junior residency, which may be equated broadly with the British senior residency. Then comes a senior residency, the duties of which are approximately those of registrar to a clinical unit. A senior resident is usually a man well advanced towards specialization. Promotion in hospitals may be on either the pyramidal or the parallel system. The pyramidal system is more selective, reducing the numbers at each stage of seniority. The parallel system envisages a separate hierarchy of promotion in each clinical unit; this multiplies very considerably the number of potential specialists, but it is expensive to the hospital or university, and there is no guarantee that any of these potential specialists will repay the debt by joining the teaching staff.

Specialization.

In the United States—as elsewhere nowadays—there is a great rush to specialize, this rush having been fostered, in part, by the demand for specialists on short-term training courses during the recent war. The practice of a specialty as to professional status and fees chargeable is controlled by the Council on Medical Education and Hospitals of the American Medical Association. So far examining and certifying boards in 19 specialties have been set up and approved. In addition, subcertification or special certification in limited aspects of a specialty is also possible. Up to July, 1949, nearly 41,000 specialty certificates in all categories had been issued (Anderson and Tipner, 1949). Each specialty has its own controlling board, which lays down the conditions for acceptance as a specialist. Such conditions usually involve three to five years' special training and experience after completion of internship. The minimum time required is about five years after graduation, the maximum up to eight or ten years for a subject like neurosurgery or thoracic surgery. The conditions are stringent, and proficiency is controlled by appropriate examinations. It would appear that the certificates issued only bestow approval to practise the specialty; they do not seem to carry any legal backing, but depend for their success upon the cohesive ethics of the American Medical Association.

THE MEDICAL SCHOOLS.

Geographical Organization.

Most of the schools belong to universities—either State or private. The university proper, housing the bulk of the usual university departments, is called the campus. The medical school may be on the campus as, for example, UCLA, University of Chicago, University of Michigan, Yale, or it may be separated by a greater or lesser distance according to the incidence of clinical material, as at Stanford, University of California, University of Illinois, Johns Hopkins, Harvard, Cornell, New York University, and so on. Frequently, the first year's work is taught in departments on the campus, but there is a preference for having these in the medical school. The remaining three years' work is done in the medical school and associated hospitals. There was general consensus of opinion in favour of placing the medical school in or alongside the hospital, and the ideal was to have both medical school and hospital on, or immediately adjacent to, the campus. The medical school is controlled by the dean and his staff.

The teaching hospital is usually closely related to the medical school. It is not uncommon to find in similar relationship such other allied institutions as a post-graduate school of varying dimensions, a school of nursing, or possibly a school of pharmacy or of public health. Some schools have special developments: for example, the Institute of Rehabilitation and Physical Medicine of New York University, the Cancer Hospital at Cornell and the Illinois Neuropsychiatric Clinic. Such an assemblage of medical facilities constitutes a medical centre. Each department has its own administrative head, and coordination of the facilities depends upon the mutual cooperation of these various chiefs. Now there is a growing tendency to group the whole medical centre under a single administrative unit headed by one man—a kind of super-dean—who, although under a different title at different centres, really ranks as a vice-president of the university.

Medical School–Hospital Relationship.

Many medical schools have their own teaching hospitals. This is, perhaps, commoner with private universities, but is also found in State universities—for example, University of California, UCLA, University of Illinois. Such a hospital is usually of moderate size—400-bed to 600-bed capacity—and may make provision for obstetrics and gynæcology and pædiatrics as well as general medicine. The hospital is wholly controlled by the university, which makes all appointments, teaching or otherwise, and determines the policy entirely. Whether the hospital belongs to a State or a private school its prime consideration is the promotion of teaching. Thus, admissions are determined mainly from the point of view of suitability for this purpose. Service to the community is normally a secondary consideration, and this can be so without reproach where such service is abundantly provided for in other private, State or municipal institutions. The justification is that the teaching hospital is giving its best services to the students and so, indirectly, to the community.

Possession of a private teaching hospital is a very expensive luxury, particularly for private universities. Nevertheless, in those that were observed the price was counted lightly against the advantages, and many were collecting funds to expand or completely rebuild their hospitals. Most private hospitals of this kind ease the financial burden to some extent by admitting private and intermediate patients as well as public (clinic) patients. In some—for example, the University of Chicago—private patients are freely used for clinical teaching to both students and graduates; at others — for example, Stanford — private patients are reserved for post-graduate teaching; elsewhere such use is governed by the patient's wishes. In most cases in which a university runs its own hospital, there is also access to the ample clinical material of the large State and municipal institutions. Where there are several medical schools in a city, they usually cooperate in the use of such material and may have a voice in the hospital appointments. Some schools have a number of affiliated hospitals which can be used for teaching purposes.

Many schools which do not own their own hospital enjoy the full services of a nearby hospital, which may be either private or State, in the control of which they have a very large say. Thus, they determine either all staff appointments or, at least, all teaching appointments. Such a hospital naturally becomes an integral part of the medical teaching system, and admissions may be manipulated to suit teaching requirements. There is usually access to other hospital facilities as well. Both the hospital and the

medical school gain by this arrangement, and such schools claim that they enjoy all the hospital control they need without suffering the inconvenience and expense of maintenance.

Some medical schools depend upon the clinical material of hospitals which do not come under either of the above categories. Although the school has representatives on the governing body of the hospital it does not exercise a decisive voice in the matter of teaching appointments or in the arrangement of admissions. Under these circumstances the appointment of teachers becomes the subject of private negotiation between the medical school and desirable members of the hospital staff, but there is little opportunity for attracting outstanding teachers to the school, since there is only limited guarantee of a hospital appointment. Except where a hospital board is particularly enlightened and obliging, the disadvantages of this system, which is not uncommon in Australia, are obvious.

However, so far as could be discovered, no medical school in the United States lacks reasonable representation on the controlling body of its main teaching hospital.

Staff.

The Dean.

In most cases the dean of an American medical school is appointed by the governing body of the university, which is usually tactful enough, however, to ensure that its appointee will be acceptable to the majority of the faculty. Only in Yale, apparently, is the dean still elected by the faculty, and for a nominal period of five years. In other schools the terms and duration of the appointment are determined by negotiation beforehand. The dean is usually, but not always, a medical man. He may be drawn from, or more or less nominally attached to, any department in the medical school, but the majority own allegiance to the department of internal medicine.

The dean may be appointed on a part-time or full-time basis. When the dean is part-time he conducts a certain amount of teaching and, possibly, research. This system is preferred where part-time deans are customary. Where the dean is full-time he has a nominal appointment as professor or associate professor in a department (mostly medicine), but practically all his time is devoted to administration. Where this system is in vogue any other is inconceivable. Actually, inquiry revealed that under the part-time system the amount of attention that could be diverted from administration to academic interests was minimal, and in the outcome there appeared to be little practical difference between the two systems. However, two important exceptions to this generalization came to notice. At the University of Michigan, Dr. A. C. Furstenberg is dean and professor of oto-rhino-laryngology, and conducts a private practice—all very efficiently; while Dr. G. H. Whipple, dean of the school of medicine and dentistry in the University of Rochester, is an eminent Nobel Prize winner in pathology and an outstanding dean. It should be added that now, at least, Dr. Whipple can delegate many of his duties to well-trained associate deans, and that he has a particularly efficient secretary to the faculty. These exceptions, however, do not invalidate the view that in the vast majority of cases the deanship is actually, if not nominally, a full-time occupation. The dean usually receives a higher salary than his professorial peers, and he may have an expense account in addition to a budgetary allowance on which to run the dean's office.

The duties and responsibilities of an American medical dean include organization and integration of the teaching in the faculty as a whole, control of the "physical plant" (teaching equipment, including the buildings), an important say in the matter of appointments to the teaching staff, supervision of students, probably some say in the allocation of research funds, possibly a part in control of the teaching hospital and post-graduate training, certainly a major role on the financial side and in serving as a figurehead for the medical school as a whole.

In this formidable task, however, he has a staff to whom many of these duties may be largely delegated. His associate or assistant deans cope entirely with all student problems, his business manager attends to the maintenance of the physical plant and to finance, his secretary provides the major integrating factor for all the departments, and there may be a registrar as well. Moreover, the post-graduate school may have its own chief and the hospital its own superintendent, while a committee looks after the research funds. These accessories do not absolve the dean from final responsibility in all these activities, but they relieve him of a great burden of administrative detail.

The upshot is that the major tasks of the dean (apart from coordinating the work of his subordinates) are two-fold. First, he must represent the medical school (and defend its projects) to the remainder of the university on the one hand and to the general public on the other. Second, he is intimately concerned with finance; in a State university he must justify the proposed budget to the legislature, in a private university he must justify the proposed expenditure in such a way as to gain academic and public approval and financial support. Raising funds and balancing the budget constitute one of the dean's major preoccupations.

Emphasis is placed upon the necessity for continuity in deanship. Schools with a quick turnover in deans suffer from instability and staff and financial troubles. While the dean nominally has a great deal of authority, a good dean establishes an air of mutual trust with departmental heads which renders exercise of such authority unnecessary. The dean should be in the position of a managing director whose task is to ensure—as unobtrusively as possible—that all departments get what they need to promote the smoothest possible efficiency. Good deans are valued highly and are sometimes promoted from one school to another in the same way as other members of the staff.

The Medical Vice-President.

The growing tendency to group all the facilities of a medical centre under a single administrative head who has no academic responsibilities reflects the increasing difficulty of integrating all these services on an efficient and economic basis. Such a head is not always called a vice-president, nor is he necessarily a medical man. At Johns Hopkins he is a physicist and is called Vice-President; at New York University he is an architect and is called Director of Administration; at Yale he is a Doctor of Public Health from Massachusetts Institute of Technology and is called Director of Medical Affairs; at the University of Chicago he is a medical graduate and dean of all the biological sciences. Although able and far-sighted educationalists are still the main objective, the major emphasis is falling increasingly upon business and administrative ability.

The Teaching Staff.

Each department has its own chief, who is also professor and is given various titles—chairman, executive head, administrative head, and so on. The staff under him varies according to the size and importance of the subject. In the basic sciences there may well be three or more full professors, three or four associate and assistant professors, three or four instructors and some assistant instructors. On the clinical side the staff allotments are even more generous, adding clinical professors in each of the major subjects and a large number of associates for the sub-specialties. In the basic sciences, so far as could be discovered, all the full professors and at least most of the associates work on an academic full-time basis.

In the clinical departments the terms of appointment differ according to the school and, broadly, fall under four headings: academic full-time, geographic full-time, part-time paid and part-time unpaid. The picture is complicated by the fact that mixtures of these systems are frequently encountered.

An academic full-time appointment means that the whole time of the occupant is devoted to university interests. This does not preclude the right of outside consultation,

for which facilities may be provided, but any fees so earned go either to the university general funds or to the department that earns the money. At the University of Chicago and at Johns Hopkins all members of all departments are academic full-time. At the University of Chicago, indeed, even royalties on scientific books revert to the university. In a geographic full-time appointment the incumbent spends the whole of his working hours in the medical school precincts, but he is supplied there with facilities for a limited amount of private consultation. This system is common because it reduces the financial burden. The amount of private consultation varies with local conditions —particularly the basic salary offered—and with the interests of the individual. Allowance of time for private work ranges from about 20% upwards. At UCLA it is proposed that the clinical teachers should be allowed to earn up to twice the basic university salary and then return any excess to the university. Part-time teachers give a half or less of their time to university purposes, and unpaid teachers presumably less still. In the last two categories the attractions to teaching lie mainly in the manifest advantages of association with a teaching hospital and the right to facilities for treating private and intermediate patients—which are usually available for teaching purposes. Part-time and unpaid systems, however, are not considered satisfactory by the best authorities, and at Northwestern University, for example, where hitherto all clinical teaching was on the part-time unpaid basis, a full-time professor of medicine has recently been appointed and other full-time heads are hoped for.

The provision of complete staffs on an academic full-time basis is exceedingly expensive. So, while that is the educational ideal, a satisfactory compromise is found in some clinical schools by engaging the head of the department on an academic full-time appointment, the remaining professors on geographic full-time appointments and junior teachers part-time.

The teaching staff in all departments is bigger than in most British medical schools. The staff:student ratio is much more favourable; a figure of 1:25 is considered mediocre, 1:12 is accepted as normal for basic sciences, but on the clinical side it may drop to 1:6 or less. At the same time there is complaint of shortage of teachers, particularly in the basic sciences, the over-all deficit being put at 10% to 20%.

The Students.

A good deal has already been said about the students, but a few observations from the administrative angle are not out of place here.

The very admission of students imposes a serious problem, for machinery must be set up to cope with the enormous number of applications. The expense of this machinery is at least partly covered by the $5.00 fee charged in each case, but the "processing" costs members of the admissions board a great deal of valuable time. And then, when the applications have been reduced to two or three times the number of vacancies, comes a series of personal interviews—sometimes two for successful applicants. New York University College of Medicine finds it necessary to close the list of applicants at the end of March (when the number stands at about 3000) for admission in the following September.

Either on application or on admission every student must present a health certificate—usually accompanied by a chest X-ray film and a vaccination certificate. The requirements differ in different schools, but he may be asked for the results of any or all of the following: Schick test, Dick test, Wassermann and Kahn tests, Mantoux test. He may have to undergo revaccination and various other immunizing procedures. The results of a professional aptitude test may also be demanded. On admission to the medical school the student must join the Student Health Service, for which an annuel fee is charged. This service provides for the routine periodical chest X-ray examinations, tests and immunizations required for medical students. The service also provides medical advice and, if necessary, attention during term time, but any unusual therapeutic measures or a prolonged stay in hospital incur extra charges. The Student Health Service is not restricted to medical students; all university students must belong.

A number of universities take some or much responsibility for housing students. Harvard and Yale, for example, have colleges, and many provide dormitories or other residential facilities near by. A not uncommon sight at present is an expanse of ex-army huts provided as living quarters for returned servicemen and their wives and children. (The fraternities and sororities are not, strictly speaking, university concerns at all. They date from the time when universities made no residential provision, and membership is by invitation only.) In addition to such amenities the universities have loan funds and student aid funds, which can be drawn upon in straitened circumstances.

Finance.

To arrive at a proper orientation towards the figures quoted here, it should be appreciated that an American dollar, which costs nearly 10s. to buy in Australia, is worth only about 2s. in purchasing power in the United States.

The School.

The budget of any medical school amounts to several hundred thousand dollars a year, and in some cases is well over a million dollars. The annual upkeep of a large medical centre may amount to eight million dollars or more. Running a medical school is, then, in the field of "big business", and it can be little cause for surprise that financial problems loom large, or that the chief administrator—dean or vice-president—is chosen as much for his business ability as for any other assets he may possess. A medical school is the most expensive possession a university can have today.

State schools, while often having some private endowments, are dependent upon the State legislature for the bulk of their financial support. Private schools are entirely dependent upon private sources. So far as could be ascertained most, or all, medical schools—whether State or private—require more financial support, their total deficit for this year being estimated at $10,000,000 (Darling, 1950). The State schools are seeking expansion of facilities or staff, or higher salaries. Private schools are similarly engaged and are frankly living beyond their income—their situation is the more acute the more closely they adhere to academic full-time staffing. Also, endowments and private benefactions are steadily dwindling in value, costs are as steadily rising. Consequently, the medical schools have combined through the Association of American Medical Colleges in an appeal to the Federal Government for financial assistance. This move takes the form of a draft bill to Congress, which it is hoped will relieve the situation while safeguarding the autonomy of the colleges. The cost involved for the first year is in the vicinity of $47,000,000. However, Congress appears to have rejected the bill for this year, at least (*New York Herald Tribune*, June 20, 1950).

The State schools are probably rather better off financially, but their appeals to the State legislature for additional funds are not always successful—for example, a request by the University of Michigan for an extra $50,000 *per annum* to increase staff salaries was recently refused. Private schools are dependent solely upon their own efforts, and if these are properly organized to catch the public imagination the result may be extraordinarily successful—thus, New York University has already raised $20,000,000 towards its projected rebuilding programme. In addition, many medical schools—Yale and Harvard are good examples—have organized their past graduates in alumni associations, through which appeals for regular contributions are directed on a year-of-graduation quota basis. In some cities—for example, Philadelphia—it is understood that commercial firms—both employers and employees—make regular contributions. And, of course, there is a regular, if not massive, source of income from the private beds in the university hospital; indeed, in some

cases, one of the factors taken into account when determining admission to such a hospital is the patient's ability to pay for treatment. The hospitals generally, both public and private, are in financial difficulties, and the term of in-patient treatment is reduced to a minimum.

As with medical schools elsewhere, the fees collected meet only one-third to one-half of the cost of training students, and this deficit is fairly uniform. Tuition fees—excluding all extras—vary from $300 to $400 for a good State school up to $850 *per annum* for the most expensive private schools. Many private schools have recently raised their fees. Medical schools everywhere appear to be in the unfortunate position that the greater the number of clients the greater the loss entailed. This is one very good reason for restricting the number of entrants. Yet it is a loss that must be borne cheerfully, since the university exists primarily to serve the needs of the community, not to balance its budget, much less to make a profit.

Despite the general financial stringency, a number of schools, both State and private, have ambitious plans for rebuilding. The University of California contemplates building a new medical school and hospital at a cost of about $21,000,000; Stanford has a $10,000,000 rebuilding programme; UCLA proposes to spend a similar sum initially on its medical school and hospital; Johns Hopkins is rebuilding part of its hospital and contemplates rebuilding parts of the medical school; and New York University proposes to spend over $30,000,000 rebuilding the whole of its medical centre (apart from the Bellevue Hospital).

Research Funds.

As is well known, funds for specific or general research are fairly plentiful in the United States. Thirty years ago such funds came in large part from organizations like the Rockefeller and Carnegie Foundations. Now the emphasis has shifted so that the grants from all such sources together constitute only a minor part of the whole amount applied to research (1949 Review of The Rockefeller Foundation). The bulk now comes from other sources, of which the Government is by far the largest. Today, the resources of the Rockefeller, Carnegie and Markle Foundations and the Commonwealth Fund are relatively restricted, and are more precisely applied: there is preference for smaller grants in marginal fields of work which promise a possible big future. Educational projects offer the prospect of producing widespread benefit for relatively modest expenditure. One of the ventures of the Commonwealth Fund, for example, is to finance the appointment of Dr. Hale Ham to study and reorganize the medical curriculum at Western Reserve University Medical School. The Markle Foundation has found a rather different sphere of activity: impressed with the economic obstacles to the employment of promising young men in academic posts it is subsidizing such appointments in the United States and in Canada for periods of up to five years. It is felt that before this term has expired these bright people will have so justified themselves in the research and academic fields as to gain economic independence in permanent academic posts.

The total of research funds now available to medical schools is very large; in some cases the annual total exceeds the annual academic budget—as at New York University. This might be considered an ideal situation, but in fact, it is raising serious difficulties (Darling, 1950). Such large sums often require the appointment of a special committee to ensure their proper allocation and employment. Care must be taken to see that the time and resources of research workers are not wasted, for example, in the routine testing of therapeutic agents for some drug firm. There is the further responsibility of coping with government assignments of a secret nature. But there are more serious problems. Thus, the medical school finds that its most eminent research workers and teachers are becoming tied up in outside affairs and are giving less and less service to the university, which, while providing salaries, space and often technical or other assistance, gains little in return. Moreover, there is a strong tendency for research workers on major projects to assemble around themselves their own team of pathologists, biochemists *et cetera*, and so become completely self-contained, to the detriment of the unity of the university as a whole. And finally, the university can never reckon permanently upon these adjuncts to research, but must continue to budget for its requirements as though no outside funds are available. Government grants are particularly vexatious in this respect, since they are renewable annually by Congress vote: applications for renewal must be submitted early, and only at the last moment is it known whether or not funds will be available to continue a long-term project in the ensuing year. There is, then, the constant risk that workers paid out of the research grant may suddenly find themselves unemployed or thrown upon the over-strained university budget.

Staff Salaries.

To some extent the terms of appointment of staff have already been discussed. In the basic sciences professorial salaries in State schools range from $6000 to $9000, in the private schools from $7500 to $10,000—but here the element of private negotiation enters, and for eminent people up to a maximum of $15,000 may be paid. There is usually a fairly wide range, within which the offer depends upon the calibre of the applicant. On the clinical side State salaries range from $6000 to $14,500, private salaries from $6000 to $15,000, but there are some complicating factors. One is the question of whether the appointment is academic or geographic full-time, or part-time, and here there is no uniformity. For example, in some schools the incumbent may be offered the same salary as the non-clinical teacher with the right to limited private practice; elsewhere he may get a proportion, say two-thirds, of the basic professorial salary *plus* what he makes in practice. The position is more elastic in some of the private schools seeking especially eminent men, and up to $30,000 may be secured by private negotiation in a full-time appointment. These variations do not, of course, apply to all schools: at Harvard, for example, all academic full-time professors —irrespective of subject or faculty—are apparently paid the same.

The remuneration for subsidiary members of the staff diminishes in accordance with their status down to $2000 to $5000 for instructors. (For comparison it may be added that a good plumber may earn $3000 a year, but a high school teacher less.)

Generally speaking, members of the medical faculty are paid more than members of other faculties, and within the faculty of medicine clinical teachers get more than teachers in the basic sciences. It is said in justification that while teachers in other faculties give teaching and research to the university, those in the medical faculty give, in addition, service to the community. It is also pointed out that in many cases non-medical teachers work on the campus, which is often in a quiet town where living is cheaper, while the medical teachers must live in or near a big city where it is more expensive to live. However, these generalizations admit of so many exceptions that one is driven to the conclusion that the salary differential is really imposed by the law of supply and demand. Almost any practising medical man can earn more than a medical teacher is paid, and an established specialist gets from $30,000 upwards *per annum*. Competition with incomes like this compels medical schools to pay high salaries to attract clinical teachers. A further differential was noted—there is a general rise in scales of remuneration as one travels across from the west coast to the east coast. Here, too, the difference has been explained as reflecting differences in cost of living, but the true answer seems to be that the wealthiest universities are in the east.

To sum up, all the medical schools are in debt, some seriously, and the parent universities are often compelled to divert to their support funds needed for other purposes. This, together with the higher medical salaries, creates dissatisfaction in other faculties. Most medical schools can command ample research funds but find that these are becoming an increasing source of embarrassment and expense: universities would prefer more generous general support for their medical schools and hospitals.

EDUCATIONAL TRENDS.

It is impossible here to do more than mention some of the most outstanding differences from our own system. One that is particularly striking is the rather sudden rise of all aspects of psychological medicine. The return of so many mentally afflicted from the armed services after World War II brought acute realization of the inter-relationship of mind and body as a clinical whole and precipitated general recognition of the importance of psychiatry. (This is parallel to the reaction which led to establishment of a Chair of Psychiatry in Sydney after World War I.) At all events, psychiatry has been elevated to the rank of a major subject—along with medicine, surgery, obstetrics and gynæcology, and pædiatrics—in the medical curriculum. Psychology, psychosomatic medicine, psychiatry and psychoanalysis now rival prefrontal leucotomy in popular appeal, and many teachers find it financially advantageous to leave the university and enter upon private practice in one or other of these fields.

An interesting example of modern trends is the inclusion of atomic medicine in the curriculum of some medical schools.

As far as general teaching goes, perhaps the most striking points are the beautiful buildings, the excellent teaching equipment, the wealth of teaching material, the small size of clinical instruction groups and the emphasis laid upon clinico-pathological conferences in preference to lectures in all branches of clinical teaching. These conferences now appear to have replaced almost entirely the conception of courses in special pathology and seem to be encroaching upon general pathology, too. The emphasis upon laboratory work is tremendous, and students are advised or required to extend their acquaintanceship with the laboratory, either by doing routine work or in an assignment of a quasi-research character. Teaching facilities are excellent in most cases, a great deal of attention having been devoted in the various operating theatres, for example, to ensuring a satisfactory view of the proceedings. Most anatomy departments lack good museums: some see no use in them, others would like them but will not give up the space, others still have only a few exhibits, but there were some good exceptions. Pathology museums are better catered for. The supply of anatomical material permits the allocation of one body to every four students and leaves a surplus for post-graduate dissection. In some cases, as in Chicago, where there are a number of schools, bodies are collected, embalmed and stored in a central agency, from which they are drawn as required.

Visual Aids.

Visual aids are extensively used in all departments for teaching purposes, and the projection facilities are frequently quite elaborate for moving film (silent and sound), strip film and cut film. Some schools have a director of audio-visual education. There are some excellent film libraries, from which films covering most phases of medical instruction can readily be hired. In addition, a number of schools prepare their own films and cartoons to illustrate special aspects of their work, and this demands the services of their own technicians with properly equipped laboratories.

Extensive use is made of medical artists, both for departmental illustration and for publications. The cost of the work done is either charged to the department which incurs it or financed as a whole from a special budget—sometimes the dean's budget. Several schools house a department of art as applied to medicine for training such artists. These departments are mostly modelled on the lines of the famous prototype established by Max Brödel at Johns Hopkins. The departmental head is a professor or associate professor and is supported by a staff skilled in all illustrative techniques. Admission for training in the best of such departments is not easy. The applicant must first be a competent artist with special aptitude for the work. The curriculum is of three years' duration and includes full dissection of the body, regular attendance at operating theatres and other hospital departments, reproduction in different media of all kinds of specimens, modelling and reconstruction work, and training in photography. Graduates in medical art find ready employment in laboratories and hospitals.

Post-Graduate Work.

To the clinician post-graduate work implies additional training in clinic and related laboratory, but the conception should be extended to all laboratory work including what is of a purely research nature. In the United States post-graduate work envisages all these aspects, and every department in the medical school offers some scope for such activities.

The facilities available for purely clinical post-graduate training vary from school to school. In some the work is conducted alongside the ordinary undergraduate teaching, others provide quite separate facilities. New York University has a separate school with its own dean and an annual budget nearly as large as that for the medical school. Where there are several medical schools close together they may pool their post-graduate resources. Thus in Chicago, where much clinical post-graduate training is centred upon the great Cook County Hospital, the University of Chicago limits its activities to an annual refresher course in the basic sciences for the benefit of some 80 or 90 physicians practising in the vicinity.

Post-graduate training is as expensive as undergraduate training, the annual deficit per head being about the same. Nevertheless, so great is the enthusiasm for such work, and so highly is it regarded, that the loss is borne uncomplainingly.

TRENDS IN THE PRACTICE OF MEDICINE.

In the United States, as elsewhere, the attention of the legislature is turning more and more definitely to the possibility of some form of national health service. This trend is bitterly opposed by the American Medical Association, which is conducting a vigorous campaign to justify private practice (*Look*, October 11, 1949). The Association was, indeed, critical of the appeal by the American Association of Medical Colleges for Federal aid on the grounds that this might provide a lever to overthrow the existing system.

There are at present a number of insurance agencies—Blue Shield, Blue Cross *et cetera*—to which people can contribute towards the provision of medical benefits. The aim of those who oppose a nationalized service is to extend the voluntary insurance principle to cover all groups of the community, yet leave the profession free. Towards this end, group practice is expanding as offering the best solution to the growing demand for more efficient and cheaper medical care (*New York Times*, June 3, 1950, page 17).

Now the medical schools are moving out into the community along various lines. A number of medical centres—New York University, Cornell, Yale and others—have adopted a system of local and regional hospital affiliation, which provides for diffusion of specialized clinical facilities and trained interns over a much greater mass of population. This system is said to have been particularly successful, and, in return, the medical schools gain by the wider experience open to their graduates.

Cornell, further, is evolving a system of sending third-year students out into private homes. Ten students are each assigned a home to look after for two years. The students come to learn about the home environment, with its special problems, and about the facilities available for relieving those problems. In time of trouble advice may be given, but no treatment. This is a costly venture, but is proving so successful that it is hoped to extend it to all students and ultimately to provide a complete home health service. The necessity for such a service is becoming more acute now that patients are discharged so early from hospitals. The full scheme embraces visiting doctors, nurses, social workers and so on.

A further development, as at Vanderbilt, Columbia, Cornell and New York University, is the establishment of group practice schemes under the title of private diagnostic units—staffed entirely by members of the Faculty. Here

patients are referred by outside practitioners for a complete diagnostic investigation at a uniform fee and are returned to the practitioners for any necessary treatment. New York University and other schools now also provide a fee-for-service unit. This is similarly staffed by members of the Faculty, who treat the patients as required. This last scheme has been strongly criticized by outside practitioners on the grounds that it is unfair competition.

In reply it is contended, firstly, that medical schools have always competed with private practitioners for patients as teaching material, and that the system merely extends to the semi-poor middle class what has always been available to the indigent poor. Secondly, that in their private capacity the staff of the clinic would in any case compete with other practitioners, and that patients who attend the clinic are simply exercising their proper right of choice of doctor. Now the patients have access to good doctors backed by the resources of a well-equipped medical centre; the medical school is thus able to give better service to the community, and especially the middle-income and insurance groups. In any case there is nothing to stop outside practitioners from starting their own group clinics. And finally, if the medical profession does not of its own accord make such a gesture towards the impoverished sick, it will finally be coerced into some compulsory scheme to meet the needs of the middle-income and low-income groups, who simply canot afford private fees in sickness any longer. In other words, it is time for the medical profession, which enjoys a high status and rich remuneration, to justify all these things—and its claim for independence—by taking the lead in initiating reforms which the changing needs of the community are now making inevitable.

DISCUSSION.

From the experience of American medical schools, an experience which now threatens Australian medical schools, it is clear that medical education generally has reached a crisis and that the whole situation requires a complete review. A medical school is a terribly expensive luxury for any university, and the expense promises to increase progressively. The question has been asked: "Is the university the proper place for a medical school?" (Sir John Medley). The answer to that is unequivocally "Yes". The medical Faculty is one leg of the tripod of Law, Arts and Medicine upon which a great number of universities have been founded and recalls the time when most advances in natural philosophy sprang from the work of men who owed their primary allegiance to Medicine. Then, the medical Faculty is the sole repository of a tremendous and growing wealth of knowledge on human biology and welfare and, even from the purely academic viewpoint, a university which contemplates divorce from its medical school must also contemplate the very serious depletion of its intellectual resources in the biological and social sciences. And finally, it is imperative for the sake of Medicine that the Faculty retain its place within the university, else will Medicine lose all it has gained from the educational and scientific contacts it now enjoys with other university departments. To the other question, "Can the universities afford medical schools?" (Darling, 1950), the answer is, "They must".

The problem of running a medical school today is almost entirely one of economics. Private endowments are dwindling in value, taxation has sapped private contributions, but building and maintenance costs continue to rise and staff salaries rise with them. When it comes to a question of revising salaries, technicians and secretarial staff get first preference because of labour demands; the teaching staff is a secondary consideration. But now the rewards of medical practice are so great that universities can no longer depend upon the altruistic devotion of their teachers to relieve their economic problems, and another solution must be discovered. The salaries of the teaching staff must be increased to a reasonably competitive level if standards are to be maintained. It is galling for an able man to discover that his intellectual inferiors can afford all the comforts his wife and family would like to have. What is the true mark of academic distinction, ". . . the Nobel Prize on the one hand or two Cadillacs in the garage on the other?" (Russell, 1949). Educationists will certainly vote for the Nobel Prize, but even the Nobel prize-winner might heave a secret wistful sigh for the Cadillacs, or at least their equivalent in extra comforts for his family.

The only successful solution to this problem so far achieved is in Britain, where the medical schools have certainly attained a fair measure of economic security and can afford salaries on a competitive scale.

In Australia, as elsewhere, private endowments and contributions are diminishing in value, maintenance costs are rising, and State governments are not in a position to increase their grants. The only solution lies in intervention by the Federal Government. The Universities' Commission has recently studied the requirements of the State universities. When these requirements come up for assessment it would be well to remember that good medical schools are a priceless and irreplaceable asset, even if—or possibly because—they do not produce atomic bombs and rocket weapons. And the experience of the last two wars indicates that a country which faces the possibility of war should see to its medical resources first, not last.

In the survey of American schools presented here certain features have emerged which appear to be particularly applicable to Australian conditions, and these features may be considered now a little more in detail.

University, Medical School and Hospital.

The medical school should be as close to its parent university as possible. That condition fortunately prevails in Australia. The medical school should be equally adjacent to its main teaching hospital—a condition not wholly fulfilled. The medical school should, if possible, own the hospital—an unknown condition in Australia; or at least it should control completely all teaching appointments and have some say in determining admissions in the interests of its teaching function—a condition that could be achieved. The ideal of total service to the community, proper to State and private hospitals, militates against the effective discharge of teaching responsibilities.

Post-Graduate Work.

While Australian medical schools are still not in a position to make very elaborate provision in the direction of post-graduate work, the basic science departments should always be open to promising students, and assistance in the way of research grants and fellowships could well be expanded beyond its present limits.

Post-graduate training in clinical fields must be maintained, despite the cost, and every effort should be made to extend its scope—particularly in the provision of laboratory facilities. The increasing financial drain must be discounted against the enormous benefit that accrues to the profession and the community from the opportunity to keep local medical knowledge abreast of recent advances.

The Dean.

The dean is, or should be, the most important member of the Faculty. Altogether apart from the growing complexity of any medical school, new developments, new views on education and a new sense of responsibility to the community demand the full-time attention of men of education, experience, administrative ability, tact and, above all, vision. Medical education is a growing, vigorous organism, and its direction offers creative outlets equal to those of any field of research; future developments can be quite as revolutionary in the educational sphere as in any other. The time has passed when the deanship could be relegated to an unimportant member of the Faculty; still less should it be the part-time burden of a man who is also part-time in practice, just because he has the ability and good will. That is unfair to both the man and the medical school. No man has the creative capacity to develop both the Faculty and a department to their optimum: one or other must suffer in the dual role. The dean of any self-respecting medical school must be able to give his undivided attention to its problems, which today require

all the organizing, imaginative and creative ability that a professor normally devotes to administration and research in his department.

The dean, then, should have full professorial rank, standing *primus inter pares* amongst his colleagues. But his extra responsibilities entitle him to some additional remuneration over the professorial level, and he should also have a contingency or expense fund to meet out-of-pocket expenses inevitably associated with his position. Moreover, he must have an adequate staff: a second-in-command to cope with undergraduate affairs, an efficient full-time secretary, as well as something in the nature of a business manager to relieve him of the necessity of attending personally to every minor mishap around the medical school. In Australia, however, the dean is not much concerned with finance or appointments, and his staff need not be as big as in the United States. He could have access to the departments in which he is interested—if only to do a little teaching or research to keep in touch. This last proviso is more important for a young man than an older one, but in any case some elasticity is necessary in this respect. To ensure reasonable continuity the initial term of appointment should be for not less than five years.

The Professors.

It has been said that "the professors are the university", and that saying contains a great deal of truth, for it is upon their calibre that the university depends for its work, reputation and future.

Practically all university departments except the clinical sciences regard the system of academic full-time service as essential. Since those other departments are not necessarily more difficult to run, and do not necessarily make greater intellectual demands, it would seem that full-time professors in the major clinical departments are equally essential. The difficulty is mainly one of finance—external competition pushes salaries to a level where most schools either avoid the issue or seek some compromise. There can be little disagreement with the view that a department will thrive better under full-time direction than under part-time direction, no matter how devoted and self-sacrificing. Reliance upon such self-sacrifice is, indeed, a reproach to any university. Universities should, then, offer an adequate reward to ensure that the clinical departments are run to the best advantage. The academic mind is not usually a grasping one, and most professors are reasonably content to work in a financial atmosphere which does them no serious indignity *vis-à-vis* their practising colleagues, even though not at the same level.

The head of a major clinical department should certainly be on a full-time appointment and, if conditions so demand, he must be paid more than his academic colleagues. He should also have at least one full-time responsible assistant paid on the same scale. The remainder of the staff of the clinical departments can still work on a part-time or honorary basis. They will ensure that the students acquire the atmosphere of private practice as well as of laboratory and clinic. It would be the professor's task to integrate their teaching. A professorial appointment certainly envisages control of a department, but the administrative burden should be reduced by adequate secretarial assistance.

The question inevitably arises: should the head of a clinical department have any consultant practice at all? As already noted, many schools in the United States rely upon this system to ease their economic burden. But apart from finance the question does raise an important principle. It has been argued that divorced from outside contacts the professor will get out of clinical touch: the answer here is that he should have enough clinical material at his disposal in the hospital. It is also argued that to deny the professor any consultant work robs the medical community of the services of, perhaps, its most able member. The opposing view asks which is the better use of his time—on a limited number of consultations for the benefit of a limited portion of the community or on teaching many young doctors, who will later diffuse his ideas throughout the community and beyond?

One further point should be raised. Many teachers in the basic medical sciences are medical graduates and could very well enter upon medical practice and earn more than the university pays them—that is why it is so difficult to attract good men into basic science teaching. Admitting that their interests are primarily academic, a strong case can still be made out for paying them more than their non-medical brethren. That is now achieved in America and Britain and the necessity must be faced in Australia. The principle also applies to most professors in science and engineering, whose services are at a premium today. There can be little doubt that the responsibility of caring for expensive equipment, large laboratories working throughout the year, and long-term research programmes imposes a much heavier burden than is borne by their colleagues in the humanities. It does not seem unfair to ask that this heavier burden should be recognized by some extra emolument—even if it is disguised, as is sometimes the case, as a "laboratory fee".

Non-Professorial Staff.

The remarks on remuneration apply equally to more junior members of medical departments. At present we simply cannot compete in the British academic market for urgently required increases in staff—and the men we have are attracted away by better conditions elsewhere. The time has long since gone when a professor and one lecturer could cope with a department and conduct effective research work as well. Indeed, that conception was altogether wrong under any educational theory, and now we badly need more people, both to improve the ratio of teachers to students (and so improve the teaching) and to provide our staff with the time and relaxation they need for research. The present fantastic staff:student ratios in most Australian medical schools are practically mediæval in conception. That applies particularly to the basic sciences; in the clinical sciences the situation is better because of the large number of honorary teachers available. It might be said, indeed, that the basic sciences suffer in the lower ranks, the clinical sciences at the top.

Laboratories.

In most Australian medical schools the basic sciences enjoy reasonably adequate laboratory facilities, but, except in Sydney, the clinical sciences suffer neglect in that respect. This is a relic of the times when clinical teaching was the part-time occupation of medical men occupied mostly in private practice and without either the time or the training to engage in organized research work. In the system envisaged here the clinical professors must have their own laboratories with adequate technical staff.

Student Health Service.

Every medical school visited in the United States had a compulsory Student Health Service. This requires evidence of fitness on admission and some provision against possible future ill-health. In particular, attention is paid to correction of defects likely to interfere with efficient work during the university course. Further, the service maintains a constant check on health throughout the course and provides appropriate treatment if the necessity arises. But in addition to its intrinsic value the service contributes to general education. Thus, as future members of the community, all students become impressed by the value of preventive medicine and public health—the most important educational developments in medicine so far—and medical students in particular come to appreciate the workings of the system in action upon themselves.

Such a facility should be a part of every Australian university. It is a lasting reproach that the supposed source of medical enlightenment should be almost completely indifferent to the well-being of the members of its own community.

The Curriculum.

In any curriculum the educational aspect must be accorded proper emphasis. The "cultural" solution adopted in the United States has been described. Most Canadian

schools follow the American pattern, but Toronto has compromised by including the appropriate subjects in the first two years of a six-year course. Australia follows the British schools, which are now trying to impart a broader outlook to their basic science course. Such a plan might well be adopted here, but, more important, there should be insistence upon better educational standards for admission to the medical course. In default of radical changes in the whole system, there should be a wider and less vocational range of choice for the entrance examination and a higher standard in every subject. Moreover, the examination should be competitive, and the number of entries severely restricted according to the staff and capacity of each medical school.

Within the framework of General Medical Council requirements, major changes in the medical curriculum itself are not easily effected. Nor are they necessarily desirable; the present arrangement is a strictly functional one, and despite superficial differences, the American and British patterns are fundamentally alike. However, a number of minor changes might well make the course more effective. Thus, a good case can certainly be made for bringing students into contact with clinical material earlier in the curriculum (Abbie, 1946)—not only for the sake of teaching material but also, perhaps more important, to quicken the students' interest in living human beings. A good case can also be made for promoting the basic teaching in general pathology into closer contact with normal histology, and for leaving special pathology to the clinicopathological conference. Most are agreed that formal lectures should be restricted to a minimum of systematic teaching, and that students would benefit from the more direct approach of demonstrations to small groups. That awaits upon staff and emphasizes the urgent necessity for more teachers in Australia.

There is increasing desire to improve the "cultural" content of the medical course proper. In the six years' programme at Toronto the final four years are devoted to professional training as in the United States, the two years of pre-medical training being partly "cultural" in content. The first year provides chemistry and physics on the science side and three subjects in the humanities: English; history or philosophy; and one of a foreign language, mathematics, anthropology, botany, or philosophy or history. In the second year, science is represented by organic chemistry, biology and introductory psychology, the humanities by a second year of the subjects chosen for first year—it being held that two years are needed to acquire a proper appreciation of the arts subjects. The standard is that of an honours course (Professor J. A. Macfarlane, personal communication). This system appears preferable to the American because it combines all the work in a single integrated course instead of two separate courses in separate institutions. But the Toronto curriculum is feasible only because the professional part of the course is reduced to four years.

Such reduction is not practicable under the British system, and an alternative must be found. This depends upon the provision of extra time without lengthening the course. The extra time might be either real or potential. Real time can be found only by reorganization. There is constant complaint over the time some subjects consume —especially in the basic sciences. However, to restrict the time allotted to basic sciences denies the educational aspirations to which all pay lip service, for it is the basic sciences which supply most of the present educational background for the curriculum (Abbie, 1948). Moreover, piecemeal encroachment upon the sciences betrays lack of over-all planning; reform must start at the top, for it is dangerous to tinker with foundations until it is known what kind of superstructure they must support (Abbie, 1946). When more staff becomes available, and particularly full-time staff, many lectures can be abandoned in favour of demonstrations, and many student waiting hours saved when teachers are no longer at the mercy of a private practice. Also, a number of specialties could well be relegated to their proper place as branches of medicine and surgery until after graduation, with consequent saving of more time. A longer working day might be considered, but this would probably defeat its own end by robbing the student of time for rest and relaxation and self-education. Compulsory choice of one or more of a wide range of electives—so rich in American schools—might well provide for education expansion along lines which are personally satisfying and therefore likely to stimulate a lively interest. Such measures, together with rearrangements suggested in the previous paragraph, offer the prospect of salvaging quite a substantial amount of time for purely educational purposes.

(There are many admirable features in the American system, but one at least does not appear to be educationally sound. That is the not infrequent custom of devoting a whole semester to one subject—say, anatomy—only. During such a course the student must be too busy doing things to stop and think about what he is doing, and he has too little time to educate himself in the subject. And this is apart from the resistance and distaste which must inevitably be engendered by constant, intensive concentration upon one subject, unrelieved by any break.)

Potential time for educational work can be gained within the present teaching framework by emphasizing the educational aspects of routine material. Every subject has a wealth of historical background, abundance of interesting characters, rich lessons in scientific approach and maturity of judgement, and ample application to the affairs of the community around. These are all the raw materials of "culture", and upon such a basis the competent teacher can fashion a course as valuable culturally as it is technically.

The Cornell system of sending students out into homes to help and advise in sickness provides an excellent insight into economic conditions in the home—the environmental background which determines the course of so much illness and all the problems which face the general practitioner when he goes out into the world. This is the most effective way in which to instil a proper appreciation of the social aspects of medicine. It is really an extension into general medicine of the well-known British district maternity system and could be copied with advantage by any medical school.

Adoption of some of the suggestions advanced here would do little violence to the general curricular pattern, yet, by reducing the present rigid subdivision into pre-medical, preclinical and clinical sections, would impress upon the student that throughout he is dealing with the same human being, albeit in different guises. He would also learn that that being, while only a special problem in biology as a whole, is the basis of the community and the source of all the technical and cultural advances upon which man's present status depends. This is the most important educational lesson that any university can impart and, since it can be instilled without detriment to technical training, it should provide a better rounded medical man than we get under the present system.

SUMMARY.

1. A general account is given of medical education in the United States.

2. So far as is possible the system is analysed under various headings, and some tentative conclusions are drawn.

3. Special developments and trends in educational and social spheres are described.

4. An attempt is made to apply these findings to the future development of medical schools in Australia.

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Nor may I forget Dr. Hugh O'Neill, of Santa Ana, California, who entertained me most generously and set me off on my way across the United States already armed with a clear picture of medical education there and a fair appraisal of an astonishing number of medical schools and personalities. He saved me a great deal of time in orientating me to a new world, and put me lastingly in his debt.

Finally, I must express my appreciation of the hospitality I enjoyed at the hands of a number of men who were all interested in medical education from a singularly detached point of view. First, Dr. John Dietrich, who heads the committee appointed by the American Medical Association and the Association of American Medical Colleges to survey medical schools, gave up his Memorial Day holiday to tell me of his work and some of its results, and to give me the benefit of his great store of information on the subject of medical education. Then, Dr. Hale Ham interrupted a night's packing to discuss his projected move to Cleveland to work upon the medical curriculum at Western Reserve University. Also some non-university, but extremely well-informed, people devoted their time to adding to my stock of knowledge and views on medical education. They were Mr. Stephen H. Stackpole, of the Carnegie Corporation, Dr. Charles O. Warren, of The Commonwealth Fund, and Mr. John M. Russell, of The John and Mary R. Markle Foundation. The breadth of knowledge and philosophical approach of these gentlemen expanded enormously my own outlook on the whole subject of medical education.

[1] It was Dr. Chandler who coined the phrase that "the dean is to the faculty as the fire hydrant is to the dog".

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[1] In addition to these references many other official publications emanating from various universities and research foundations were consulted. A list of these will be included in the author's reprints.

THE "TRAP" HEADACHE.[2]

By JOHN BOSTOCK,

Brisbane.

THE Oxford Dictionary defines "headache" as "a continuous pain in the cranial region of the head". This non-medical definition has the merit of excluding the sudden, fleeting and explosive varieties which are usually not a feature of the functional headache found in psychiatric practice. It also excludes the rare hysterical type, which is sometimes sufficiently agonizing to warrant consideration of the possibility of brain tumour.

As headaches are such a common feature in ordinary life, as indicated by the phenomenal sale of headache powders, it might have been thought that the name would loom large in the field of phrase and fable. Brewer in his "Dictionary of Phrase and Fable" deals with heads and tales, heads turned, neither heads nor tails, coming to a head, but not a mention of a headache.

In headache there is a characteristic intangibility. It comes on, it leaves, and is forgotten. Even its precise location is not usually remembered. It is indescribable in the sense that words do not correctly assess its qualities. Such descriptive prefixes as splitting, roaring, terrible, cutting, piercing, deadening, sickening, though real to the sufferer at the time, convey little meaning to the observer. Furthermore, it tends to occur with monotonous regularity in the neuroses, psychoneuroses and psychoses.

My own interest in headache has been perennial. It commenced with a maternal diathesis and the common medical experience of personal migraine. Even with this background I regretfully confess an inability to describe accurately the feelings associated with headache. This exasperating hiatus impelled me some years ago to attempt a classification of headaches through verbal description. Sites were noted and patterns were recorded, but, as might have been expected, they bore no fruit. Whilst failure may have been due to my lack of a suitable technique, it is more probable that the impossible was attempted. A headache represents an underlying process which is as untranslatable as a smell. If one attempts to describe the odour of roses, the best approach is that it smells like roses. The only valid description of "headache" is that of "headache".

[2] Read at a combined meeting of the Section of Neurology and Psychiatry, the Section of Ophthalmology and the Section of Oto-Rhino-Laryngology, Australasian Medical Congress (British Medical Association), Seventh Session, Brisbane, May-June, 1950.

Personal research to find the causes of headache covers several decades of medicine. It commenced appropriately enough with the discovery of my own astigmatism. The purchase of glasses with various corrections, shapes and shades enriched the optometrist, but had fleeting results on the headache.

The septic-focus theory and the gastro-intoxication theory received close attention, but neither tonsillectomy nor purgatives had more than a temporary success. The same applied to a close attention to the developing field of allergy. Positive skin test results for certain foods gave promise that cure was in sight. In spite of a rigorous diet, the head pain persisted. It seemed that anything and everything gave only temporary relief. Holidays were most helpful, but there was often the "hangover" in another attack.

The last phase of discovery was due to a medical colleague, who informed me that he had never had a headache since he learned to swear. It was his opinion that the prime cause is repressed "hate". This can be discharged by the upsurge of emotion which accompanies a blasphemous outburst. His lecture was a vivid introduction to my present concept of a nervous headache.

If his theory of repressed "hate" is analysed, it will be found to embrace the reality of "conflict". There is a "war in the mind" between the desirable and the obtainable. There is an underlying frustration, the sufferer is in the "trap" of destiny. He wishes to escape, but the exits are barred. The situation is "hate-full". When this arises the headache appears. The formulation and discharge of the oath changes the situation. He "vents his spleen" and discharges his emotion. The situation is altered, the headache disappears.

A familiar example of the frustrating factor occurs in Christmas shopping. A headache is an almost invariable occurrence owing to the cleavage of thought as the merits of a myriad "this" or "that" or "those" are considered.

Armed with the psychological viewpoint, I analysed the problems of every friend, acquaintance and patient who had persistent headaches. They occurred in men and women attempting to cope with an enormous amount of work beyond their scope; others wrestled persistently and unsuccessfully with the dæmon of guilt, the reality of an "impossible" husband or an incorrigible child. The variety and type of headache are as varied as the situations which produced them. Some tread the hair-line between tragedy and comedy, as in the case of the woman whose headache occurred only when she was lying down in bed and on the side which exposed her to *vis-à-vis* contact with her husband, or as the mysterious headache recurring after or during the week-end holiday to herald return to the unsatisfactory wife or over-boisterous household.

The following example is taken at random.

An intelligent married woman, aged twenty-eight years, complained of severe headaches for the previous two years. They occurred almost daily and life was becoming unbearable. She was in the habit of taking two to six "A.P.C." powders daily. Prior to two years previously she had suffered from only a periodic headache of migraine type. Her mother also suffered from migraine.

The above history suggested that some factor had come into her life two years previously and she was "trapped". A search for the factor revealed that her second child had been born two years previously, and she had very nearly lost her life owing to a post-partum hæmorrhage. She had had a similar near-tragedy with her first child owing to a face presentation.

On being questioned, she admitted that she was terrified of the possibility of a further pregnancy; but the "trap" was closed because she felt she had to continue marital relations with her husband, since she knew they were necessary for harmonious matrimony.

The "trap" was opened when her husband was brought into the consultation and he was told that together they must get sound contraceptive advice. When she was assured of her immunity she returned happily to normal relationships, and the headaches returned to their mild pre-pregnancy pattern.

The results of treatment by altering the way of life and the personal slant on its psychological problems are gratifying and often dramatic. The patient who, faced with a headache, flies to sedatives or to the doctor, can be taught to make a self-analysis with a successful adjustment.

The therapy requires a frank discussion on the basis that the headache denotes a conflict. The "trap of destiny" situation must be faced, no matter how derogatory or difficult it may be.

The critic, impressed with the eye strain, toxic or diet aspect of ætiology, will point to the undoubted benefits of treatment based on the materialistic concept. The remedies are used with success, but always with the addition of the psychological support. It seems probable that suggestion and persuasion are largely responsible for the good results.

In every discussion of headache, migraine must be considered. It is an outstanding example of a generalization which, though facetting one aspect of truth, has misleading implications.

Sadler (1945) in his text-book makes the following statement:

> Headaches present a clinical puzzle demanding all the resources of psychosomatic medicine. Here we encounter sinus infections, constipation, and supposed auto-intoxication, eyestrain, focal infections and blood pressure. But the vast majority of these head miseries are nervous and emotional in origin. Many headaches are "reflex"—the real trouble exists elsewhere in the body.
>
> Even hereditary migraine is definitely associated with mental and emotional factors. It is seldom found by itself—numerous other psychoneurotic symptoms go along with these sick headaches. I am of the opinion that there are four or five different sorts of this ailment.

The classical migraine attack includes photopsia, coloured figures, hemicrania and gastric disturbances, and there is almost invariably a familial inheritance. The illness is so dramatic as to suggest a cause inexplicable on psychological lines. This is accentuated by its chronicity and resistance to ordinary therapy.

It must be remembered that conflict commencing at puberty can be so canalized by facilitation that it becomes an integral part of the personality pattern. The migrainous tendency is so fixed that the outburst occurs after minimal stimulation and is resistant to therapy, particularly in sensitive individuals. It is the psychological situation which unleashes the vascular brain storm.

The tendency for occasional bizarre symptomatology to occur, as in classical migraine, is probably of no more importance than the odd peculiarities noted in the menopause or stones in the gall-bladder. These are interesting variants of academic interest.

Surely it is time for us either (i) to discard the use of the term "migraine", except for the extremely rare classical variety with associated hemicrania, photopsia, photophobia and gastric disturbances, and use the term "trap headache" or equivalent, or (ii) to change its usage by a new definition such as the following:

> Migraine is the commonest type of headache. It may be either bilateral or unilateral, circumscribed or diffuse, showing wide ranges of duration, chronicity and resistance to therapy. The outstanding ætiological factor is a conflict of ideas and emotions as occurs in a "trap" situation from which the sufferer cannot escape. Resulting vascular changes in acute attacks intensify the feelings of pain and discomfort.
>
> Often the headache appears to have a familial tendency which may come either from their genes, producing a sensitive nervous system, or from the adverse familial environmental influences.

In practice it is sometimes difficult to dissociate the toxic headache from the emotional variety. Sometimes they occur together, as in the alcoholic "hangover" associated with remorse. The differentiation requires a careful physical and psychological overhaul. The "trap" concept is not an excuse for neglecting the general principles of medicine, which include insistence on the complete examination.

The theme of this paper is that the identical nature of headache symptoms has been responsible for the confusion which has arisen in ætiology. For years we have striven

to find an organic or physiological cause and are finally driven to the conclusion that a psychological dysharmony is the chief factor.

Having come to this conclusion, we may reasonably search for the basic mechanism underlying headache. It seems likely that the organic *versus* psychological controversy is reminiscent of Byrom's Tweedledum and Tweedledee, in the quarrel about the claims of two rival schools of musicians:

> Some say compared to Bononcini
> that Mynheer Handel's but a ninny;
> Others aver that he to Handel
> is scarcely fit to hold a candle.
> Strange all this difference should be
> 'twixt Tweedledum and Tweedledee.

The key to the problem is found in the fundamental physiological principles which underlie the process of thought. Are we to suppose that the electrical brain potentials revealed by the electroencephalograph change haphazardly according to Rafferty's rules? Surely it is more likely that brain functioning conforms to the orderly pattern of all other functions. Just as there is within certain defined limits a constant of body temperature, must there not be a constant of neural energy? This thesis was outlined by me in 1931 (Bostock, 1931). Subsequent experience has confirmed my belief in its reality.

The constant of neural energy hypothesis enables us to unravel the predicament of Tweedledum *versus* Tweedledee.

A cleavage of thought as in the "trap" situation implies that the constant of neural energy is involved in additional pathways.

There is an inevitable alteration in potential, since the same amount of energy must serve for two or more sets of emotionalized thinking patterns. If it is sufficiently great, and in particularly sensitive individuals, it registers as "headache".

It seems reasonable to suppose that alterations in constant of neural energy occur in melancholia. In this condition there is a generalized hebetude in which thought, feeling and action are restricted. The patient cannot think clearly, and it is likely that these symptoms are associated with underlying neural change. This is supported by the excellent results of convulsive therapy, which cures the headache and at the same time relcases a bounteous flow of energy into normal channels. Incidentally, electroplexy is efficacious in dealing with "trap" headaches. Their disappearance in such therapy is almost invariable.

The manic patient might be expected to have headaches, since this condition is the reverse of melancholia. Headaches do occur under conditions of excitement; but the condition is complicated by distractibility and evasion, whereby sensations, even if present, are not noticed.

It is a common finding that even an intense headache may disappear under the stimulus of a new thought, excitement or action. This has already been inferred in discussion of the results of various methods of treatment. The process is "cure by auto-evasion". Headache is sidestepped through the nervous energy coursing into a new channel and thereby evading the cleavage which reduces the potential.

The mechanism is not solely influenced by thought and feeling. Alteration in the distribution of the constant of neural energy may arise as the direct result of a toxin or an allergen. Are we to be surprised, therefore, if the registration of headache is identical? And if our occipital cortexes are bombarded by two competing engramizations due to astigmatism, surely the resultant headache is to be expected.

In conclusion, may I be permitted the privilege of inventing a dictum?

> **If there are any here with recurrent headaches they are probably psychological in origin and certainly less mysterious than they seem. They can always be favourably influenced by adequate psychotherapy.**

Summary.

1. Classification of headache by description is inherently impossible owing to the basic principles involved.

2. Success in therapy based on concepts of eyestrain, toxicity and allergens is largely psychological.

3. Hate and conflict are important ætiological factors. Sufferers are caught in the "trap" of destiny.

4. Treatment by psychotherapy dealing with "trap" situations is highly satisfactory.

5. The term "migraine" should be redefined; a new definition is suggested.

6. Headache is the registration in consciousness of changes in potential in the regulating mechanism which provides a neural energy constant. Consideration of this gives a satisfactory explanation of headache. Changes in this potential can be due to organic causes. This accounts for the identical nature of the headache in both organic and psychological types.

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HEADACHE OF NASAL ORIGIN.[1]

By R. H. BETTINGTON,
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THE dividing line between headaches of nasal origin and those due to other causes is not very definite, and it is likely that there may be some statements in this paper which will overlap the work of others. I have drawn up the paper under the following headings: (i) history, (ii) types of headache and character of pain, (iii) causes of pain, (iv) diagnosis, and (v) treatment.

HISTORY.

The earliest recorded mention of headache is made by Hippocrates, who lived from 460 to 377 B.C., but he speaks only in general terms; Jacob Wepfer in 1728 was the first to record that nasal obstruction caused violent headache. H. Airey (1870) recognized the association between asthenopia and frontal headache, while E. Liveings (1873) published an article called "Megrims, Sick Headache, and Some Allied Disorders"; this deals mainly with migraine. In this work there is no mention of headaches in relation to the nose, but there are references to symptoms that leave no doubt that some of the headaches were of nasal origin.

Rumbold (1880) first called attention to nasal disease as a direct cause of headache, while in 1884 Morrell Mackenzie recorded that frontal headache was frequently a symptom of frontal sinusitis.

Ziem (1886) gave an account of his own personal experience of maxillary sinusitis. Sluder (1900) investigated affections of the nasal ganglia and traced the nerve paths of pain. He recognized vacuum headache, and was one of the chief pioneers of our present knowledge.

Yankhamer (1908) described a method for diagnosing headaches of nasal origin. He showed that steam inhalations favoured sinus drainage by shrinking the mucosa and stimulating ciliary action.

Since then authors, too numerous to mention, have advanced our knowledge to its present stage.

TYPES OF HEADACHE AND CHARACTER OF PAIN.

The types of headaches may be classified as follows: (i) those in connexion with the walls of the nose; (ii) those in connexion with the paranasal sinuses; (iii) neuralgia.

Nasal headache is, generally speaking, intermittent, and its position varies with the part of the nose causing it.

[1] Read at a meeting of the Section of Oto-rhino-laryngology, the Section of Neurology and Psychiatry, and the Section of Ophthalmology, Australasian Medical Congress (British Medical Association), Seventh Session, Brisbane, May-June, 1950.

The headache associated with the frontal sinus is situated diffusely over the frontal region and likewise with the maxillary sinus. Headaches associated with the sphenoid and ethmoid sinuses are noticed behind the eyes and over the vertex. Commonly when infection is of long standing, there is pain in the back of the head and in the neck and shoulders, in addition to the other sites mentioned.

Headaches are less frequent when the patient has been recumbent for a period, and so are not so noticeable at night. In the case of maxillary sinusitis the pain gradually lessens when the patient lies with the affected side uppermost. Frontal headaches commonly begin in the middle or late morning and become worse during the active hours, subsiding as these activities become less. Maxillary pain comes on slightly later in the day as a rule, but also subsides at night.

In all instances the pain is of a deep, dull, aching, non-pulsatile quality, and is seldom associated with nausea or vomiting. The more acute the infection the more severe the headache as a rule, and though the pain of acute infection can be severe, it is not in the highest degree of severity. Wolff has classified pain in degrees from "1+" to "10+", the latter figure being the index of intolerable pain, and he found that the degrees of sinus pain varied from "½+" to 1+" in chronic cases, to "5+" in the most acute. Many observers will think this figure too low; my own experience is that occasionally the headache of acute frontal sinusitis is close to the "8+" mark. The headache is usually reduced or abolished by maximal doses of codeine or aspirin. Intensity of pain is increased by shaking the head or bending forward, or by any factor which increases the venous pressure, such as straining, coughing, a tight collar, any form of emotional stress, alcohol and tobacco.

Vacuum headache, with which may be classified mucocele of the frontal sinus, occurs only in the frontal region, is not so periodic as that due to infection, and is of low intensity.

Aviation has introduced a fresh type of nasal headache known as sinus barotrauma. As a result of rapid changes of altitude, pain may be experienced over the frontal or maxillary sinuses, the lining mucosa may swell greatly and hæmorrhage may even occur.

Neuralgias of the nasal and sinus sensory nerves may be through the sphenopalatine ganglion or branches of the trigeminal nerve. A. Laskiewicz has classified nasal neuralgias as follows: (i) Sluder's syndrome or sphenopalatine ganglion neuralgia. The nasal aspect of this pain is situated at the base of the nose and over the upper jaw and temporal region. (ii) Charlin's syndrome, neuralgia of the naso-ciliary ganglion. Pain occurs at the side of the nose and the inner canthus. (iii) Neuralgia of the anterior ethmoidal nerve. Pain is felt at the base of the nose, at the medial frontal region, and deep in the orbit. The pain in these cases is superficial, there is more actual skin soreness than in the sinus headache, and there is also less likelihood of daily periodicity. These neuralgias are not regarded as true nasal headaches, but they produce a problem in differential diagnosis.

CAUSES OF PAIN.

Though pain can be induced experimentally, and though certain stimuli give rise to pain in definite positions, it must be confessed that many examples of nasal pain are quite unexplained by physical findings, and for these some psychological cause must be evoked. Emphasizing this, Proetz has divided nasal headache into three categories: (*a*) those for which there is a demonstrable cause; (*b*) those for which there is a suggestive cause—for example, psychoneurosis, migraine, fatigue, or occupation; (*c*) those for which no cause is found.

Headache in Connexion with the Nasal Wall.

According to Mollison, it has been stated that simple pressure of the septum on the middle turbinate is the most common cause of headache of nasal origin; but why should a common anatomical deformity cause pain in some cases? Watson Williams agrees that the above statement is true, but postulates that there is some sinus infection complicating the simple contact in most cases. Sprigg records fifteen cases of submucous septal resection for the relief of headache, in only one of which was the desired result obtained.

There is no doubt that pressure of one structure on another is not the only factor, because numerous patients with contact septal deflections, large bulbous turbinates, or noses full of polypi do not complain of headache.

Wolff tested several volunteers, and stimulated various portions of the lateral and medial nasal walls by wiping them with one in 1000 adrenaline solution, touching them with a probe, and finally stimulating them with a faradic current by means of a wire insulated to near the tip. The patients then indicated where the pain was felt.

The nasal septum in normal subjects was sensitive throughout to light touch, and pressure with a probe elicited moderate pain ("1+" to "2+"), which was felt in the spot touched, and sometimes was referred to the following locations: from the middle part of the septum, along the zygoma towards the ear; from the ethmoid area, to the inner and outer canthus of the eye on the same side.

Stimulation of the turbinates found them more sensitive than the septum; a sharp burning pain was felt at the point and along the outside of the nose. The points of stimulation were referred as follows: the anterior portion of the inferior turbinate, to the upper teeth; the middle and posterior portions of the inferior turbinate, to the infra-orbital region and along the zygoma towards the ear; the middle turbinate, along the zygoma, back to the ear and to the temple, and occasionally deep in the ear; the superior turbinate, to the inner canthus, the forehead, and the lateral wall of the nose.

The pain recorded in these cases reached "4+" to "5+" and was found to be more intense and to last longer in subjects with engorged mucosa over the turbinates; in one case the pain persisted for eight hours after removal of the stimulus. Patients with complete section of the trigeminal nerve root had no sensation at the site of stimulation, but only a feeling of pressure deep in the head. Stimulation of the ostium of the maxillary sinus gave a sharp burning "6+" pain at the site, which increased to "8+" on attempts to push the stimulating point through the ostium. In addition, a "4+" aching pain was felt in the naso-pharynx, in the back upper teeth, along the zygoma, and back along the temple, and the pain did not subside for twenty-four hours.

Stimulation of the frontal duct gave substantially the same results as stimulation of the maxillary ostium; it was extremely sensitive. The referred pain began at the inner canthus and spread out over the same area as for the ostium.

Stimulation over the posterior ethmoid area again gave "6+" pain in the area, and was referred to the inner orbit and the upper teeth.

Headaches in Connexion with the Para-Nasal Sinuses.

According to Mollison, various factors appear to be involved in the production of sinus pain, for example: (*a*) changes in intrasinus pressure; (*b*) vasomotor and allergic rhinitis with sinusitis; (*c*) secondary reflex effects.

Changes in Intrasinus Pressure.

Wolff has performed interesting experiments on intrasinus pressure. He found that the inner sinus walls, when stimulated by faradic current, were only slightly sensitive to pain in all cases. One of Wolff's patients had a fistula into the left antrum through the first molar tooth socket. A pharyngoscope could be introduced, and the mucosa was seen to be normal, and the ostium open. Stimulation of the inner walls gave very slight sensation, except at the ostium, where pain was "2+". Next a thin rubber balloon was introduced through the fistula with a catheter attached, and the latter was connected with a manometer. A positive pressure of 15 to 25 millimetres of mercury produced a sensation of pressure and fullness, but did not cause any pain after three and a half hours; a pressure of 200 millimetres of mercury had to be reached before pain was felt. Next, pressure of 50 to 80 millimetres of mercury was applied for two and one-quarter hours before

"1+" pain was experienced over the outer wall. Quick forced inhalations of air through the left nostril increased the pain to "4+" and enlarged the painful area. The state of the turbinates was noted during a six-hour period of slow inflation, and they were seen to swell gradually; when they had occluded the nostril, pain was felt with a pressure of only 50 millimetres of mercury. Application of procaine to the turbinates at once reduced the pain.

This suggests that the pain arises from engorgment of the turbinates, and it is probable that this is a considerable factor; but it does not account for the clinical condition in acute or subacute sinusitis, when a discharge of pus, either naturally or by surgical drainage, relieves the pain immediately. Again, everyone who has performed a "proof puncture" knows the patient's feeling of increased pain when fluid is forced in, and before the ostium opens, and if suction is applied to the needle pain is just as severe. It would seem likely that most of this pain is due to the sensitivity of the ostium itself, which has been shown to be far more pain-conscious than any other portion of the inner aspect of the sinus.

Negative pressure up to 150 millimetres of mercury applied to the antrum of Wolff's same patient produced a state of apprehension and feeling that the face would collapse, but there was no pain. At 250 millimetres of mercury "4+" pain was felt. After this experiment the cotton tampon put in to block the ostium was found to have been partly drawn through the opening, and it is probable that this caused the pain.

Sluder found that relief of pressure on the opening of the naso-frontal duct usually cured frontal vacuum headache, which he held to be due to negative pressure.

Hilding performed an experiment on a dog as follows: With the dog under general anæsthesia, he drilled holes in the frontal sinuses—two holes in the left, one in the right. He put cannulæ into each sinus and connected them with manometers. Into the third hole he put mucus from another dog, and then sealed the hole. The manometer connected to the left sinus registered 66 millimetres of water, negative pressure, while the right remained at zero. Presumably this negative pressure was due to efforts by the cilia to expel the foreign mucus.

Sinus barotrauma is considered to be due to increased or decreased pressure in the sinuses as the aircraft is ascending or descending, and the ostium becomes blocked as a preliminary.

Vasomotor and Allergic Rhinitis with Sinusitis.

Any condition producing congestion and swelling of the lateral nasal wall and the turbinates will, in view of the foregoing evidence, assist in the production of headaches *per se*, and if it is in combination with sinusitis the effect will be even more evident. The combination is frequent, and often in cases of sinusitis which has been relieved, headaches persist as a result of the secondary congestive condition.

There is no doubt that the application of a local anæsthetic agent to the swollen turbinates in cases of acute sinusitis relieves most of the pain at once, even though there is no release of pus.

Wolff has shown that occlusion of the venous return from the head leads to rapid swelling of the turbinates, and to pain if there is any nasal deformity; but a similar swelling of the antral lining, as demonstrated by lipiodol injection in asthmatics, gives rise to no pain.

Buzoianu demonstrated the close relationship between the nasal and meningeal vascular systems. He states that nasal headaches can be due, not only to local obstructions and general toxæmia, but also to the stimulation of the trigeminal-sympathetic system which controls the tonus of both vascular areas. Irritation of the nasal mucosa, with accompanying congestion, is transmitted to the meningeal capillaries. Relief of headache by cocaine application to the nose is explained by the simultaneous vasoconstriction in both systems.

That the dural vessels are sensitive structures has been shown by Ray and Wolff, and by Penfield and McNaughton. According to these authors all headaches are due to disturbances transmitted through the sensory cranial nerves. At intracranial operations under local anæsthesia, they have found that pain is recognized only in certain restricted areas. The most sensitive structures are the dural vessels, the cerebral arteries at the base of the brain, the venous sinuses, and the basal portion of the dura.

Secondary Reflex Effects.

Occipital headache used to be considered a result of infection of the sphenoid sinus, but Wolff has shown this not to be the case; no occipital pain is felt on direct stimulation of the sinus on either the outer or inner walls. This pain is common in all types of chronic sinusitis, and has been shown to be muscular in origin. The pain itself is due to retained metabolites after prolonged contractions; these contractions are reflex from the stimulation of the infection. This pain has been produced experimentally and is almost invariably relieved when the infection is eliminated.

Neuralgias.

The neuralgias have been mentioned already as not true nasal headaches, though some observers maintain that they arise as a result of infection of the neighbouring sinuses. There appears very little evidence to support this in all cases, though in some it may be true. Fay has stated recently that Sluder's syndrome is not a neuralgia at all, but is vascular in origin, and has no connexion with the nose. Mollison states that, though he does not consider that nasal neuralgias are due to nasal disease, he thinks that damage to nerves as a result of nasal operations is often responsible for severe and lasting trigeminal pain.

Other Forms of Headache.

I have not considered the pain due to periostitis over osteomyelitis or that due to malignant disease, because time will not permit, and because I consider that these are not truly part of my subject.

DIAGNOSIS.

In the diagnosis the history is most important because headache can be a symptom of so many diseases. Even in the group of nasal headaches there is a large pattern of differential diagnosis, and the history can establish significant facts such as the duration of symptoms, the influence of occupation, allergic manifestations, or suggestion of latent or obvious sinusitis.

Examination will make obvious any intranasal abnormality such as septal deflections, hypertrophied or atrophic nasal mucosa, polypi, or abnormal secretions anteriorly or posteriorly. Careful palpation of the face will reveal any tender spots, and percussion of the teeth may establish dental origin.

Transillumination is frequently helpful, particularly when there is a pronounced difference on one side.

X-ray pictures should always be taken of the sinuses if there is any doubt at all, and "proof puncture" is both an aid to diagnosis and a method of treatment. In these days of selective chemotherapy, suction through the "proof puncture" cannula and culture of the recovered fluid are frequently of value.

Testing for allergic sensitivity is indicated in a large number of cases in which the history and appearance suggest it.

In view of Wolff's findings, it seems probable that anæsthetization of the area over the spheno-palatine ganglion, as advocated by Sluder to establish the presence of a neuralgia of that nerve centre, acts more as a vasoconstrictor of the neighbouring turbinal mucosa and is of doubtful value in diagnosis.

TREATMENT.

It is not proposed to go into details of treatment of all the nasal conditions which may cause headache; salient features will be mentioned briefly. Treatment of the headache entails relief of the congestion of the turbinates,

particularly around the sinus openings. This will produce immediate relief. Deformities such as severely deflected septa should be rectified, and nasal polypi removed. These operations will help to maintain the nasal mucosa in its normal state.

Hypertrophied or congested turbinates must be treated, preferably by cauterization and by resection as a last resort.

Sinusitis must be treated—and that treatment has tended to become more and more conservative during the last twenty to twenty-five years. Chemotherapy has been of great assistance in this respect.

Short-wave diathermy has been strongly advocated in recent years, as a treatment both for sinusitis and for headaches, and some ridiculous claims have been made for it. We must remember that short-wave diathermy produces deep heat in the tissues, that is all it does. Deep heat is a very valuable therapeutic agent, but it is not a universal panacea.

Allergic conditions require desensitization, cauterization, or changes of climate or occupation, and treatment with anthistamine drugs or with histamine itself.

In many cases of headaches of all sorts there is a large functional element, so psychological treatment may be required. Any excessive use of tobacco and alcohol must be checked, and the value of rest, both mental and physical, should not be forgotten. There are probably more drugs on the market for relief of nasal congestion than for any other complaint; most of them have some value and every medical man has his likes and dislikes.

Vitamins and hormones are valuable at times, and of course numerous sedatives and analgesics are prescribed.

Conclusion.

Headache is a common symptom of nasal disorders, and in every case of unexplained headache a careful examination of the nose and sinuses should be made.

Experimental evidence suggests that the pain of nasal headache is produced by congestion of the turbinates and pressure on the sinus apertures. Even if the headache appears to be of nasal origin, careful examination should be made of all other possibilities, to eliminate a dual cause.

Immediate treatment lies in relief of intranasal congestion.

CONGENITAL HEART MALFORMATIONS IN PÆDIATRIC PRACTICE.[1]

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Rising over the last few years in a magnificent crescendo of deep physiological research, superb observation and diagnostic skill, and with grand concepts of surgical relief elaborated in the laboratory and consummated on the operation table, the subject of the congenital heart malformation is coming to occupy a unique position in medical and especially pædiatric practice.

The child with the heart abnormality of congenital origin of yesteryear in public hospital practice rarely aspired to more than one fleeting visit to "out-patients", there to receive a universal diagnosis of pulmonary stenosis, to be told "nothing can be done", to be not seen again except in a last dismal terminal episode.

To be sure, with many congenital heart abnormalities little has changed; with others a glorious page in medical and surgical progress has been written, and the end is not in sight.

The grand, stimulating, albeit tantalizing, problems of the congenitally abnormal hearts are so varied and colourful as to make the prosaic sameness of the established "hearts rheumatic" a very dull picture indeed. Yet even here the barren soil gives promise; for operations have already been performed upon stenosed mitral valves of rheumatic origin.

We must remember one salient point about congenital abnormalities of the heart. With few exceptions we deal with hearts which owe their major disability to factors mechanical and physical. The myocardium is not damaged by inflammatory or degenerative process; the myocardium is a good one. Given correction, partial or complete, of the hæmostatic disability under which it is labouring, it will nobly respond—always provided that the relief is granted before damage irrevocable and irreversible is sustained. Sometimes this is possible, often it is not; the whole purpose of the thoughts expressed herein is to direct attention to that which is possible in curing or ameliorating congenital heart abnormalities.

Advances such as these are due to the coordination of the labours of many distinguished minds, and in this regard the writings of Maude Abbott (1932), Parkinson, Bedford and Evans (1936), Robert Gross (1939), Crafoord (1945), and Blalock and Taussig (1945) will always be landmarks in an exciting story.

Basically the problem of all concerned in the diagnosis and management of congenital heart disease is as follows: "Is it possible by operative means to improve the mechanical or physiological difficulties under which this heart is operating?"

Aspects of Diagnosis.

There will now be discussed certain aspects of diagnostic routine, upon the correct interpretation of which depends the precision or otherwise of diagnosis, which in turn will determine future action in a given case.

Bruits.

So important in giving an indication that a heart lesion is present, relatively so impotent with one important exception (the patent ductus murmur) in giving an exact anatomical diagnosis of the actual abnormality, bruits must be assessed with due circumspection.

Functional Bruits.

Functional bruits are so extremely common in childhood and have such little significance that their characteristics should be noted lest unnecessary restriction and invalidism be imposed. (*a*) They are very short and very soft, often musical and twangy, and are always systolic in time. (*b*) The majority are basal; occasionally they are apical. (*c*) They are usually louder with the subject in recumbency, but not always so. (*d*) Exercise sometimes diminishes, sometimes exaggerates the murmur. (*e*) There are no symptoms, and the findings from fluoroscopy are normal.

When one considers the irregular nature of the interior of the heart, its hills and dales, its crests and troughs, it is surprising that every heart has not a murmur of some sort.

Murmurs in the Newborn.

Murmurs in the newborn, which are always systolic, can present several problems. Firstly, there are no two sounds, produced in such fundamentally different ways, which are so acoustically alike as the systolic bruit of a congenital heart lesion in a young infant and the breath sounds from the surrounding lung. It is ridiculously easy to miss the bruit completely unless one manages to get a short apnœic period, during which the bruit declares itself.

Having decided that a bruit is present in a newborn infant, what should be one's reaction to it? The following points may be noted.

1. In a cyanotic baby the bruit is good evidence that a congenital heart lesion is present and is the likely cause of the cyanosis. There will, of course, be exceptions to this; for example, the cyanosis may be due to atelectasis, and the bruit transient only.

[1] Delivered as a post-graduate lecture at Shepparton, Victoria, on June 17, 1950.

2. In a non-cyanotic baby of normal appearance and in no distress, for example, on feeding, the bruit should be observed over several days before its presence is indicated to the parents; many of the bruits are transient "adjustment" bruits and of no consequence.

3. If, however, in addition to the bruit, there is manifest distress, for example, on feeding, there is grave likelihood of a severe cardiac lesion. If also on examination of the heart under the X-ray screen it is seen to be grossly enlarged, one's suspicions are confirmed. If fluoroscopy in such a case shows a heart of normal size and shape, even with distress present, the outlook may be quite good, though a guarded prognosis must be given.

A baby recently had just these features: a bruit, considerable distress on feeding, no cyanosis, and a normal-sized heart. For some months this baby progressed slowly, and one had visions of a relatively crippling lesion making its mark, but by the age of nine months the bruit had gone, and by the age of twelve months the baby was very nearly normal in weight, activity *et cetera*, and her future appears bright. Just what that lesion was is difficult to say, but it undoubtedly caused embarrassment in its early stages, and finally cleared, apparently completely.

Organic Bruits in Congenital Heart Malformations.

With one exception organic bruits in congenital heart malformations are essentially "non-specific", that is, they give comparatively little help in the exact elucidation of the anatomical defect present, a point which is especially true in the abnormal hearts of infancy. The great majority are systolic in time, are loud and harsh in quality, and tend to have their maximum intensity in one of three places: mid-sternal at the level of the fourth or fifth rib, the left border of the sternum at the same level, or the left border of the sternum at the second left intercostal space. As may be anticipated, aortic lesions tend to propagate their murmurs into the vessels of the neck. Conduction to the axilla, so characteristic of acquired lesions, which are often mitral in origin, is not characteristic of congenital heart bruits. Conduction to the scapular region posteriorly is frequently seen in patency of the *ductus arteriosus* and in coarctation of the aorta.

The location of maximum intensity of a murmur is of more diagnostic import than its type, for example, tricuspid murmurs tend to be low down and mid-sternal, septal defects to be low and to the left of the sternum, pulmonary stenotic murmurs and the ductus murmur in the second left intercostal space, and aortic murmurs about this latter level but mid-sternal and conducted into the great vessels of the neck. The rather faint murmur of coarctation of the aorta, however, is best heard on the left side just below the clavicle, close to the sternum.

The murmur of the patent ductus is, of course, a thing apart. It is one of the true diagnostic signs in congenital heart disease; it is indeed one of the few really diagnostic signs in the whole wide realm of medicine. Rarely indeed does it betray its trust.

Classically it is a "machinery" or continuous murmur, as befits the sound produced by a current of blood flowing rapidly in one direction (from aorta to pulmonary artery) through a narrow channel; its site of maximum intensity is the second left intercostal space, and its conduction out under the clavicle and to the scapular region posteriorly.

The bruit is louder and higher in pitch in systole; it is fainter and lower in pitch in its diastolic phase. In infancy and early childhood it is often systolic only. For it to be continuous the aortic diastolic pressure must be higher than the pulmonary diastolic, a state of affairs which is not reached until the second year of life, when systemic activity exerts its relatively greater demands upon the left side of the heart.

As late as six years of age, or even later, the diastolic element can be extremely difficult to hear, but it cannot be emphasized too strongly that the more perfect the conditions of hearing, the less difficult will it be to hear the murmur. It is essential to have absolute quiet for adequate auscultation. After being laughed to scorn as an instrument of precise diagnosis for many years by the upstart X-ray tube and the string galvanometer, the stethoscope, so far as the patent ductus is concerned, is the important diagnostic instrument. But it demands one condition—absolute quiet.

It can be a tragic thing when, through faulty auscultatory conditions, a ductus murmur is missed, and a child with a heart labouring valiantly but vainly against its mechanical disadvantage is sent back to a remote country home to live out its dismal dyspnœic existence. When one realizes how brilliant can be the effect of early closure of the ductus the tragedy of such a happening is abundantly apparent.

One final word on detecting a difficult ductus murmur, and some can be very difficult. A full deep breath held in full inspiration will reduce temporarily the pressure in the pulmonary artery, increase the flow through the ductus and sometimes help to make more definite the continuous element which is so important in making a positive diagnosis. The quality of the ductus murmur, but not its location, is simulated by a small group of diverse conditions. They are as follows: (i) The venous hum, a continuous murmur heard over the base of the heart and in the supraclavicular fossæ. It is an innocent murmur produced by simple vascular distortion and alterable or eliminated by varying the position of the head. (ii) The murmur of large collateral bronchial arteries compensating for the diminished pulmonary artery output in the tetralogy of Fallot. (iii) The to-and-fro murmur of a ruptured sinus of Valsalva. This murmur is of sudden onset and not truly of continuous character. There is an essential acoustic difference between a continuous and a to-and-fro murmur. (iv) The continuous murmur caused by vessel distortion by cerebral tumours, heard during auscultation of the skull. (v) The murmur of arterio-venous communications and some angiomata anywhere in the body. (vi) The uterine souffle.

Radiography and Radioscopy.

Radiography and radioscopy are valuable diagnostic measures, and certain comments upon them are pertinent, particularly in regard to their limitations.

Three standard positions, the antero-posterior, the left anterior oblique, and the right anterior oblique, are used to obtain profiles and outlines of the chambers and great vessels of the heart, the normal radiological architecture of which is now well established.

But silhouette games are notoriously games of chance: human facial profiles in shadowplay can be very alike; yet add the colour of hair and eyes and that nebulous thing expression, and the whole interpretation changes.

Human hearts can look very alike on the fluorescent screen or developed plate and yet be poles apart in their pathological anatomy. The Eisenmenger complex and the patent ductus may have similar appearances, both having prominent pulmonary arteries and congested lung fields.

The converse is also true, that congenitally abnormal hearts of identical type may have greatly differing contours; for example, of two cases of patent ductus normal appearances may be found in one and in the other the characteristic full pulmonary arteries and congested lung fields.

The state of the lung fields, their vascular congestion, normality or avascularity, is a point of great importance and often decisive regarding operation; for example, any patient with a cyanotic lesion having very clear or avascular lung fields is immediately a possible candidate for operation. A patient with a cyanotic lesion having congested lung fields is not such a candidate.

Two final points may be made. The first is the immense importance of correct centring of the film for radiography and the timing of the exposure to coincide with full inspiration—no easy task in infants. The second is the extraordinary distensibility of the superior *vena cava* and

left pulmonary artery as shown by their shadows in a crying infant. In some babies these two structures when distended will extend nearly to the rib line, and a film taken at that most inopportune moment will give an extraordinary distortion of the true state of affairs in the upper part of the mediastinum. With the next full inspiration the two structures deflate like pricked balloons and normality is restored. The congested lung fields, which have become almost radioopaque from straining, now fully light up.

Failure of the left pulmonary artery shadow to dilate and of the lung fields to become very congested when a baby screams during radioscopy is suggestive evidence of some degree of pulmonary stenosis, either pure or as part of a tetralogy.

It is for these reasons that the statement can be made: "Radioscopy for diagnosis; radiography for record."

Electrocardiography.

Electrocardiography has considerable limitations as a diagnostic aid, but the following statements give some indication of its place in investigation. (i) There is usually right axis deviation in the tetralogy. (ii) A tetralogy-like syndrome presenting left axis deviation is suggestive of tricuspid atresia with a poorly functioning right ventricle. (iii) The patent ductus usually has no deviation, because the mechanical stresses of the abnormal arterio-venous shunt fall equally on the two ventricles. (Two successive patients operated on recently by Dr. Russell Howard had a right and left axis deviation respectively.) (iv)) Aortic stenosis and coarctation of the aorta show left axis deviation; pulmonary stenosis shows right axis deviation. (v) It is incorrect to assume that because, for example, right axis deviation is present there is necessarily right ventricular hypertrophy. Usually this is so, but not always. The use of the precordial leads gives rather more accurate information.

Cardiac Catheterization.

In a children's hospital dealing with the under-fourteen age group cardiac catheterization as a method of investigation has severe limitations. Many of the children are very small, their veins tiny, and the technical problems, and those of physics, formidable.

The method can never give the beautiful delineation of cardiac architecture of which angiocardiography is capable. It cannot give to the surgeon such precise information of vessels to be used in anastomotic procedures as does angiocardiography.

For these reasons at the Children's Hospital, Melbourne, angiocardiography has at least for the present been given precedence over cardiac catheterization.

Angiocardiography.

Angiocardiography is a procedure of great value in the diagnosis of cardiac malformations. It is based on the principle of the rapid injection of a substance with a high (70%) iodine content into a cubital vein and the radiological tracing of that substance in its passage through the heart and lung fields.

The work of Laubry *et alii* in Paris in 1935 in injecting the hearts of cadavers demonstrated the anatomy of the chamber and great vessels, and all work since has aimed at perfection of technique and interpretation. Considerable success in accurate diagnosis has been achieved, and from the surgeon's point of view the delineation of vessels likely to be required in anastomosis, as in the tetralogy, is of importance. Brock, for example, uses angiocardiography if at all possible as a preliminary to operation in the pulmonary stenotic group. The results achieved at the Children's Hospital, Melbourne, with this procedure have been most gratifying.

Relative Frequency of Malformations.

In order to give an idea of the relative frequency of the various lesions encountered, the following table, composed of 100 cases culled at random, is presented.

Patent ductus	24
Ventricular septal defect	18
Pulmonary stenosis	14
Tetralogy of Fallot	13
Aortic stenosis	4
Auricular septal defect	4
Coarctation of the aorta	3
Eisenmenger complex	2
Interruption of arch of the aorta	2
Transposition of great vessels	3
Aortic ring	1
Anomalous venous return	1
Atrio ventricularis communis (in Mongol)	1
Tricuspid atresia	1
Undiagnosed	9
	100

In some of these cases the patient had more than one lesion The main lesion is indicated in the table.

It is a notable thing that only once, so far, in the series of cases at the Children's Hospital has a history of rubella or other significant illness in the mother during pregnancy been obtained. If, however, cases are encountered from an institute for deaf-mutes, there is a high incidence of pregnancy rubella. There has been one instance of a brother and sister, each with a patent ductus. The cases of patent ductus show a preponderance of females to males of five to one.

Non-Operable Conditions.

A brief comment will be made on the non-operable conditions indicated here.

Ventricular Septal Defect.

The ventricular septal defect, or *maladie de Roger*, produces a loud, harsh, systolic bruit to the left of the sternum, a minimal left to right shunt, no symptoms, no cardiac enlargement, and no limitation of longevity. Very occasionally subacute bacterial endocarditis develops, and dental extractions should have penicillin cover. Occasionally the septal defect is "high", that is, very close to the valve area, in which case a considerable shunt into the low pressure pulmonary artery may occur and produce dilatation of that artery and congested lung fields.

Eisenmenger Complex.

The Eisenmenger complex is not dissimilar to the high ventricular septal defect, but has in addition the aorta straddling the interventricular septum, so that a shunt from the right ventricle occurs with consequent mild cyanosis. The absence of pulmonary stenosis distinguishes this lesion from the tetralogy and allows some congestion of the lung fields and a full pulmonary artery, and carries the lesion from the field of operability.

There is also some evidence in the Eisenmenger complex of a curious pulmonary pathological state.

Farber, of Boston, has made sections of an injected lung and has shown multiple tiny arterio-venous communications which by-pass the alveoli.

Over the years the flow through these channels apparently increases, and this arterio-venous shunt may be responsible for the late onset of cyanosis in the Eisenmenger complex.

Auricular Septal Defect.

The auricular septal defect is a much more crippling defect than the ventricular. It allows a left to right shunt of such degree that the right auricle and ventricle and pulmonary arteries become greatly dilated and the lung fields so congested that hilar dance occurs more than in any other lesion. The heart becomes globular and has a systolic and often a diastolic bruit over the mid-sternum about the third left intercostal space. The children affected are small and weedy, with delayed puberty; they are likely to suffer from rheumatic endocarditis and pulmonary

infections, but, strangely enough, not from subacute bacterial endocarditis. They live two, three or four decades, a life of considerable restriction (though as children they are often tiny, terrier-like and surprisingly active), and finally are defeated by a failing right side of the heart.

Congenital Aortic Stenosis.

Congenital aortic stenosis is occasionally found. The child has, as may be expected, a harsh murmur at the base of the heart conducted into the vessels of the neck, and a low systolic blood pressure. Often these children are symptomless; often there are definite signs of infantilism. The angiocardiograph gives evidence of constriction at the base of the aorta with, curiously enough, a pronounced dilatation of the ascending part of the aorta just distal to the valves.

Complete interruption of the arch of the aorta is an unfavourable lesion, usually fatal within a few days of birth.

Transposition of the Great Vessels.

Transposition of the great vessels produces a cyanotic lesion, pulmonary congestion, and a characteristic angiocardiograph showing early and full opacification of an aorta coming off the right ventricle. For life to continue at all there must be crossing of the circulations, either by septal patency or patency of the ductus.

When the ductus remains patent there occurs the phenomenon of differential cyanosis, that is, an upper extremity which is more cyanotic than the lower. But the lesion is a serious one; quite apart from the gross abnormality present, the coronary arteries are supplying reduced hæmoglobin to the myocardium. Progressive enlargement of the heart occurs with increasing cyanosis, and life is rarely prolonged beyond the second year. It is interesting to note that this lesion has no deleterious effect on the circulation of the unborn child; actually the systemic circulation is if anything rather better off.

Anomalous Venous Return.

The anomalous venous return, in which all the pulmonary veins enter the right auricle or the superior *vena cava*, is a severe lesion, usually not compatible with life for more than a few months. Recently, however, an extraordinary case was seen, in which the above situation was present; there were, in addition, a huge pulmonary artery and ductus, the latter supplying the systemic circulation, the left auricle was blind and had no entry vessel, there was no septal defect, and the left ventricle, having little to do, was small and atrophic. The whole body circulation was carried on by the right ventricle, greatly hypertrophied for the purpose, and the ductus nobly remained patent—a good example of the law of survival dependency. If it had closed, death would have rapidly occurred; with it open, the child survived to the age of ten years.

Operable Conditions.

Patent Ductus Arteriosus.

Without question the patent ductus is the most important congenital heart lesion towards which our energies are bent. Actually it is, of course, a great vessel rather than a heart lesion; it affects the heart secondarily. In this respect it differs from the tetralogy, which has an intracardiac abnormality as well. The results of operations are vastly different from those for the cyanotic lesions; closure of the ductus (if performed early) produces an essentially normal heart; the Blalock-Taussig and Potts operations are ameliorating procedures only.

Diagnosis of the patent ductus is based almost entirely on that grand diagnostic sign, the continuous murmur in the second left intercostal space conducted out under the clavicle and even to the body of the scapula posteriorly, usually with a very loud second sound and congested lung fields.

In classical cases this is accompanied by a rather weedy physique, a high pulse pressure, some limitation of effort, and a cardiac contour showing a rather large heart with prominent left upper border and congested even pulsating vascular bed close to the hilus. The shunt being from left to right, there is no cyanosis. In such cases as these ligation of the ductus by a competent surgeon is wholly indicated. The rapid post-operative reduction in the size of the heart, the decrease in pulmonary congestion, and the increased tolerance for effort are gratifying in the extreme, not to mention the freedom from the nightmare of subacute bacterial endarteritis.

What of cases of patency of the ductus in children who are completely symptomless, winning races at school and full of life and energy? The decision is here more difficult, but in my view affected children in the age group before puberty, provided one has competent surgery, should all be operated upon and the abnormal shunt closed.

The reasons for this decision are as follows.

1. It is impossible, in a young child, to predict its cardiological future; many are symptomless for years before the strain of the shunt begins to tell.

2. The actual surgery is much simpler in the early age group; later the ductus tends to become broader and thinner and the adjacent great vessels more friable and more likely to tear.

3. It is probable that as the pulmonary pressure rises over the years the continuous element of the murmur may be lost and the true diagnosis never made.

4. Closure of the ductus when the heart is big and dilated has been shown to have a less favourable effect than when operation is performed before the myocardium is irretrievably damaged.

5. Subacute bacterial endarteritis, though rare, may occur at any time, and this greatly aggravates the operative difficulties of closure.

The Tetralogy of Fallot.

The tetralogy of Fallot, now famous from the brilliant work of Taussig and Blalock, was first described by Sandifort in 1777, again by Peacock in 1866, and finally by Fallot, of Marseilles, in 1888. Fallot included in his series cases of pulmonary atresia or the "extreme tetralogy", in which the patient must retain a patent ductus to survive.

The tetralogy comprises two primary lesions, dextroposition of the aorta and pulmonary stenosis. The other two or secondary lesions, patent interventricular septum and right ventricular hypertrophy, are directly dependent on the two primary lesions.

Briefly, the symptoms are cyanosis and dyspnœa in greater or less degree from birth, with a pronounced tendency to the curious phenomenon "squatting", and also to attacks of unconsciousness, which are a direct result of the extreme hæmoconcentration and increased blood viscosity found in these cases.

In squatting the children will rest on their haunches Hindu fashion whenever they are distressed. They say it relieves the dyspnœa and aching legs. It is a pronounced characteristic of all patients having cyanotic lesions with deficient blood supply to the lungs; it is not a characteristic of patients having cyanotic lesions with adequate blood supply to the lungs, for example, the Eisenmenger complex. There is a curious knee-chest position which these children also adopt when in distress; it also, apparently, gives relief.

There are cyanosis, clubbing of fingers and toes, enormously high red cell counts (9,000,000 per cubic millimetre), and high hæmatocrit readings (70% to 80%). Characteristically the heart is of fairly normal size, and there is a systolic bruit maximum in the second left intercostal space. The second sound varies, but, rather importantly, is never reduplicated. The pulse pressure is narrow, the electrocardiogram shows high peaked *P* waves in Lead II, and right axis deviation. Fluoroscopy shows a concave or flat conus and very clear or avascular lung fields. In the left anterior oblique position the aortic window is radiolucent owing to the small size of the pulmonary trunks. The aorta is "right sized", that is, it ascends to the right of the trachea in 25% of cases. The angiocardiograph shows early simultaneous filling of

the aorta and pulmonary arteries, and poorly filled lung fields. This demonstration of the size, shape and presence or absence of the pulmonary arteries is one of the most important functions of angiocardiographic work, giving, as it does, an accurate forecast to the surgeon of the vessels he will encounter.

The principle of operative relief lies in the diversion into the pulmonary circulation of some of the poorly oxygenated blood, shunted, by virtue of the overriding aortic origin, into the systemic circulation. This is achieved by anastomosis of a systemic vessel, such as the subclavian artery, to the right or left pulmonary artery (the Blalock-Taussig operation), or by an anastomosis between the aorta itself and the left branch of the pulmonary artery (the Potts operation).

Recently the possibility of a direct attack on the stenosed valve of the infundibulum has been attempted by R. C. Brock, of Guy's Hospital, the theoretical advantage being that there is not created an artificial *ductus arteriosus* as in the other two operations: it is essentially an attack on one of the basic lesions, that is, pulmonary stenosis. It is too early to assess fully the future of this operation in the tetralogy. In pure pulmonary stenosis it is the only possible operation conceivable at this time and may have a very big future.

Whatever be the ultimate future of these unfortunate children, there is little doubt that the relief from operation is definite and can be dramatic at times. The heart, of course, can never become normal (as can the patent ductus), but when one sees the improved colour, exercise tolerance, restoration to normality of the blood findings and increase in vascularity of the lung fields one can have little doubt that a great deal has been achieved.

Coarctation of the Aorta.

There are two types of coarctation of the aorta, the "infantile" and the "adult" types. In the infantile type there is a diffuse narrowing between the left subclavian artery and the entrance of the ductus, usually with other cardiac malformations; the condition is rarely diagnosed and the child affected does not survive infancy (hence the title).

In the adult type there is a local constriction just proximal to the ductus, which impairs the supply of blood by this route to the lower extremity, kidneys *et cetera* and which gives to this lesion its pathognomonic findings of absent femoral pulses. An extensive collateral circulation to bypass the constriction develops by way of the subclavian arteries, the thyreo-cervical trunk, the internal mammary artery, and the costo-cervical artery and their various branches, which anastomose with the intercostal arteries. The blood in these latter vessels flows in a retrograde manner to the descending part of the aorta to supply its requirements.

Four possible syndromes arise in this condition. They are as follows.

1. The lesion may be symptomless and consistent with long active life. Some of the troops who fought through World War I were found on their death years later from unrelated cause to have had a coarctation of the aorta.

2. There may be a syndrome of gross hypertension in the head and neck and upper extremity, with epistaxes, headache and cerebral accidents, coupled with low pressure in the lower extremity, limb pains, intermittent claudication *et cetera*.

3. Subacute bacterial endarteritis may develop at the point where the high pressure jet of blood from the aorta proximal to the constriction impinges on and erodes the intima just distal to the coarctation.

4. The aorta may rupture. When it does, it is always at the proximal end of the distal segment, probably because of the effect of the high pressure jet mentioned above.

The diagnosis is usually simple, provided one thinks of the condition, and if palpation for the femoral pulse is a routine point in examination. The absence of this pulse is a true diagnostic sign. The *dorsalis pedis* artery pulsation is also absent, large visibly pulsating collateral vessels may be palpable along the vertebral border of the scapula, there may after puberty and sometimes before be notching of the ribs visible in the X-ray film, there is usually a quiet systolic bruit below the left clavicle and posteriorly, and there is a raised blood pressure in the upper extremity.

The treatment, when indicated, is excision of the constricted segment. This is an operation of considerable difficulty and some risk, a point which adds to the difficulties of making a decision whether to operate or not. What, for example, should be done for a symptomless child in whom the lesion is discovered accidentally in routine examination? It would appear wise to observe such a patient yearly and review the situation.

A very well-developed, symptomless girl was recently discovered to have a coarctation and a slight rise in blood pressure. It was decided to adopt conservative measures. Less than three months later she complained of recurring small red spots in both feet, never in the hands. After a period of observation, operation was performed by Dr. C. J. Officer Brown, it being felt that the lesions must represent small emboli arising from the area of attrition in the distal segment. After a stormy time from a chest infection she made a good recovery, and her femoral pulses are now palpable.

A rising blood pressure, headaches and epistaxes would constitute evidence in favour of operation, but it is a decision not lightly to be made.

Other Great Vessel Abnormalities.

Robert Gross has reported a case of an infant who suffered from recurrent bouts of respiratory tract infection and pronounced stridor over a period of several months. X-ray examination with barium placed in the œsophagus and lipiodol in the trachea showed a definite constriction of both structures just above the bifurcation of the trachea.

Operation showed that an aortic ring was present and in combination with a tight *ligamentum arteriosum* was producing gross constriction and distortion of the œsophagus and trachea. Division of the *ligamentum arteriosum* and of the anterior aortic arch produced a brilliant cure.

These lesions probably are more common than suspected, but they rarely give rise to symptoms.

Another type of lesion which may give rise to symptoms, with dysphagia, is an abnormal origin of the right subclavian artery which arises from the descending aorta on the left side and passes behind the œsophagus, indenting it, on its way to the right arm.

Though these lesions are uncommon causes of stridor and dysphagia in a child or infant, they do enter into the differential diagnosis of such conditions.

Conclusion.

What are the thoughts which highlight the subject of congenital malformations of the heart, their diagnosis, prognosis and treatment? They may be stated as follows.

1. The immense importance of absolute silence during auscultation.

2. The ease with which bruits in the congenitally abnormal hearts of infancy may be missed, and the circumspection required in assessing the significance of such bruits.

3. The limitations of radiology in diagnosis, the greater importance of fluoroscopy as compared with radiography, and the rising importance of angiocardiography.

4. The need of all evidence, from clinical, radiological and other methods of special investigation, to ensure maximum diagnostic accuracy. Two signs only can be classed as truly pathognomonic, the murmur of the patent ductus and the absent femoral pulses of coarctation of the aorta. Rarely indeed do they fail.

5. The operability of five lesions: the patent ductus, the tetralogy of Fallot, coarctation of the aorta, certain great vessel abnormalities, such as the aortic rings with signs of tracheal or œsophageal compression, and pure pulmonary stenosis. Attempts are being made to operate on mitral stenosis of rheumatic origin. The importance of childhood operation in the patent ductus is stressed. Any child with a cyanotic lesion and clear or avascular lung fields is a possible candidate for operation.

Reports of Cases.

THE LAURENCE-MOON-BIEDL SYNDROME.

By R. HERTZBERG, F.R.A.C.S.,
Sydney.

THE Laurence-Moon-Biedl syndrome, comprising obesity, hypogenitalism, mental retardation, polydactyly and retinal degeneration, is uncommon. Up to 1929, 200 cases had been placed on record (Fraser, 1944). Most cases described have been incomplete; but in all obesity, mental retardation and retinal degeneration have been present, these three signs being sufficient to designate any particular case as the Laurence-Moon-Biedl syndrome.

The case described herein presents all the features of the syndrome with the possible exception of hypogenitalism.

Clinical Record.

Miss L.T., aged twenty years, was at birth a full-time baby whose weight was eight and a half pounds. She was considered a normal baby at birth apart from the fact that she had an extra toe on each foot. These supernumerary toes had been removed when she was six months old. When the child commenced to walk the mother thought that the vision was probably not normal and she considered the baby to be fat. The mother said that henceforth the patient remained fat. She made poor progress at school, and it was considered that her poor vision contributed to this. She had always been able to get about quite well, but in the last few years the vision had deteriorated so that now she was able only to go about the home without assistance. However, she is able to collect eggs from the nests on the poultry farm on which she lives. Some efforts to lose weight by diet and thyreoid medication had been made in the past, but without result. She commenced to menstruate at the age of fourteen years, the menstrual periods being regular but the flow scanty and of short duration (two days). The periods stopped during the times when she was dieting and while she was taking thyreoid extract.

On examination, the patient was five feet one inch in height and weighed 13 stone. She was a pale girl with a vacant expression and with her face directed to the floor. She was cooperative and was able to carry out orders and answer questions, but was obviously of poor intelligence. She could undress and dress herself unassisted. The abdomen, hips, buttocks and thighs were grossly fat. The blood pressure was 115 millimetres of mercury, systolic, and 75 millimetres, diastolic, and there was a loud systolic murmur which was propagated through to the back. A scar was present on the lateral aspect of the base of each little toe. The visual acuity was less than 6/60 in each eye, and there was only a small hypermetropic error. The eyes were divergent and tended to pursue searching movements. Examination of the fundi revealed optic atrophy, attenuated vessels, chorio-retinal degeneration and bone corpuscle pigment typical of *retinitis pigmentosa*.

The patient had been examined by a neurosurgeon some seven months before I examined her, and his findings were as follows:

> X-rays of skull revealed no significant abnormality, the cerebro-spinal fluid was clear and under normal pressure and the Wassermann reaction was negative. Air studies revealed a ventricular system within normal limits and the electroencephalogram revealed a generalized slow wave dysrhythmia.

This patient was the younger of two children, the elder being a boy. Both parents are well, but are first cousins —the children of two sisters.

Discussion.

There can be no doubt that the patient presents the classical picture of the Laurence-Moon-Biedl syndrome.

Cockayne *et alii* (1935) reviewed the literature and discussed various manifestations of the syndrome. They found that pigmentary disturbance of the retina, which sometimes takes the form of *retinitis pigmentosa*, was the appearance characteristic of the Laurence-Moon-Biedl syndrome. The eye symptoms differ in one important respect from typical *retinitis pigmentosa*; the juvenile onset of a severe fundus lesion is uncommon in classical *retinitis pigmentosa*.

The polydactyly is usually post-axial in position and hexadactyly is commonest. This patient had post-axial hexadactyly at birth.

The vacant expression and poor intelligence of this patient are typical; most observers state that the children are backward from early infancy.

It has been found that the obesity in these cases conforms to one of four recognizable types (Cockayne *et alii*, 1935): thyreogenic, the picture of myxœdema, hypophyseal as seen in the Fröhlich syndrome; adrenal, as seen in the adreno-genital syndrome; and cerebral and cerebellar types caused indirectly by pituitary and hypothalamic disturbance. The case described—and, in fact, most cases—conform to the Fröhlich type of adiposity.

Consanguinity of parents appears to be of some consequence, but is not a constant finding; however, it should be enquired for in the recording of the case history. The parents of this patient were first cousins.

Certain associated conditions have been reported—namely, microcephaly, oxycephaly, brachycephaly, *genu valgum*, congenital heart disease and deaf mutism (Burn, 1950). This patient presented what was probably a congenital cardiac murmur.

The pathogenesis of the disease is obscure, but it probably arises from an hereditary genetic defect. Cockayne *et alii* (1935) describe it as follows:

> The defect is inherited as an autosomal recessive, but it is most unlikely that a mutation of a single gene causes both the skeletal defects and the retinal changes with mental deficiency, obesity, and hypogenitalism. The polydactyly and other skeletal defects are due to an abnormal division of the primitive mesenchyme, or to some other mesodermal error of development, whereas the rest of the syndrome depends upon an abnormality of the retina and diencephalon which are epiblastic.

Summary.

A case of the Laurence-Moon-Biedl syndrome is presented. The only relevant family history was consanguinity of the parents.

Acknowledgement.

I wish to thank Dr. Gilbert Phillips for allowing me to quote his neurological findings.

References.

Burn, R. A. (1950), "Deafness and the Laurence-Moon-Biedl Syndrome", *The British Journal of Ophthalmology*, Volume XXXIV, page 65.

Cockayne, E. A., Krestin, D., and Sorsby, A. (1935), "Obesity, Hypogenitalism, Mental Retardation, Polydactyly and Retinal Pigmentosa: The Laurence-Moon-Biedl Syndrome", *The Quarterly Journal of Medicine*, Volume V, page 93.

Fraser, J. (1944), "Laurence-Moon-Biedl Syndrome", "The Medical Annual", page 182.

Reviews.

AFRICAN SCHISTOSOMIASIS.

IN his "Schistosomiasis in South Central Africa"[1] Dr. Gelfand has made a careful clinical and pathological study of the disease as it occurs in the native inhabitants of

[1] "Schistosomiasis in South Central Africa: A Clinico-Pathological Study", by Michael Gelfand, M.D., M.R.C.P.; 1950. Cape Town and Johannesburg: Juta and Company, Limited. 9¾" × 6", pp. 252. Price: 25s.

Southern Rhodesia and the neighbouring territories. In this area the incidence of infection is high, and both *Schistosoma hæmatobium* and *Schistosoma mansoni* occur. An exhaustive analysis is made of the clinical features and laboratory and autopsy reports of cases drawn from a wide experience of the disease.

In a chapter on diagnostic aids it is considered that the cercarial antigen skin test is of limited value, and cannot replace the demonstration of the ova. Since a negative response to the test does not necessarily indicate freedom from infection, and false positive results occur not infrequently, the test must be used with full knowledge of its limitations. Though in the early stages of schistosomiasis an eosinophilia, usually of high degree, is to be expected, over half the long-established infections were associated with less than 4% of eosinophile cells in the blood.

A detailed review of the relevant literature is incorporated upon each aspect of the subject treated, and comparisons of the author's findings are made with those of workers from other places. Australian interest in this disease was highest during the 1914-1918 war, when large numbers of Australian troops were exposed in the Middle East. This is reflected in references to the work of Fairley, Williams, Dew (whose initials are wrongly shown), Lawton, Shaw, Summons and other Australians.

The work was produced as a thesis for the M.D. degree of the University of Capetown. In some parts it shows a wordiness which, though perhaps not unsuitable in this original role, might with advantage have been amended for publication. The author, however, is to be congratulated upon his thesis, and his book will be found of value by workers on schistosomiasis, and doubtless welcomed by his local colleagues.

DIABETES.

EACH new edition of Dr. Lawrence's "Diabetic Life", "a concise practical manual for practitioners and patients", as he calls it, always contains something fresh to be learned.[1] The present edition, still further revised and enlarged, follows the same conversational manner and arrangement as its thirteen predecessors.

In an era of intensive experimentation and publication, the comprehension of which demands a first-class acquaintance with the basic sciences, Dr. Lawrence has incorporated almost all of the resultant clinical progress in his silver anniversary edition. With true Scottish caution he is loath to accept some of the latest views on heredity and on the need for potassium administration in diabetic coma or for hormones in pregnancy, until more fully proven. Simplification of some of these problems is so difficult that he has been wise to omit them rather than to attempt the task.

With the passage of time, Dr. Lawrence's views on diet have become liberalized, and he now insists on weighing or measuring only the concentrated carbohydrate of a moderate carbohydrate diet. But he will not tolerate the prescription of a "free diet", and is obviously convinced of the greater danger in infections, the early complications, and the frequency of obesity or serious hypoglycæmia, which such a plan fosters. The best chapters are still those concerned with insulin, and he is still reluctant to give up the two daily injections of soluble insulin in severe diabetes, a method which is elsewhere largely obsolete. He makes little mention of the intermediate insulins, globin and NPA 50, which are having a reprise in the United States of America. He has apparently encountered less of the variable effects of mixtures of soluble and insoluble insulins in the same syringe than we have. He favours control by "short term urine tests" at periods of maximum insulin activity rather than at times of anticipated maximum blood sugar levels. It is debatable which gives the better information. Dr. Lawrence emphasizes the fundamental necessity for an understanding on the part of both physician and patient of the time-action curve of each variety of insulin, and of the natural daily trends of the blood sugar curve in the individual of average activity and habits. He understands and preaches the limitations of insulin treatment "namely that the metabolism of a severe diabetic cannot be kept physiologically normal . . . by any type of insulin treatment which is tolerable to the patient". The necessity for continued care, for the recognition that insulin dosage may have to be altered frequently, in the severe or "brittle" case, but not too suddenly, and the necessity for individualization of treatment wherein the patient's own reactions and experiences must be given due recognition, are all emphasized. One wishes that Dr. Lawrence would dilate more upon the psychological reactions to diabetes and discuss such difficult questions as a method for determining renal threshold, diabetic diarrhœa, the sudden and spontaneous variation in insulin requirement unrelated to infection or exercise. His book still remains the world's best practical guide to the general practitioner in the management of his own diabetics.

[1] "The Diabetic Life: Its Control by Diet and Insulin: A Concise Practical Manual for Practitioners and Patients", by R. D. Lawrence, M.A., M.D., F.R.C.P. (London); Fourteenth Edition; 1950. London: J. and A. Churchill, Limited. 8" × 5¼", pp. 256, with 18 illustrations. Price: 10s. 6d.

X-RAY DIAGNOSIS.

VOLUME III of a "Text-Book of X-Ray Diagnosis", edited by E. Cochrane Shanks and Peter Kerley, has been received from the publishers, H. K. Lewis, of London.[1] This is an important and colossal work and the various sections have been contributed by several of the most prominent British radiologists. The present volume covers the alimentary and biliary tracts, the abdomen generally, obstetrics, gynæcology and the urinary tract. It is impossible to review in detail this important work, and the various conditions described cannot be covered adequately in a short review.

The section on the salivary gland describes the technique of examination and the author (Cochrane Shanks) states that there are no untoward effects in carrying out sialography.

The pharynx and the upper part of the œsophagus can be examined by direct inspection and in most cases this is sufficient, but further information can be obtained by X-ray examination in most cases.

The authors point out that the cardiac sphincter is not an anatomical but is definitely a physiological one. Methods of examination include a careful screening and the mechanism of deglutition is investigated with both thin and thick emulsions. It is also recommended that examination be made with the patient in the supine position. Atresia and web-membrane can be demonstrated by careful examination. Diverticula are considered in detail and the illustrative skiagrams are of excellent quality. Cardiospasm is covered adequately and the authors point out that in these cases the usual cardiac gas bubble is absent.

In the section on gastro-intestinal work it is considered that with fine barium sulphate available it is better to make the examination with a suspension in water rather than in the form of a mucilage suspension or some form of malted milk or butter milk. Fluoroscopy is all-important, but supplementary skiagrams must always be taken and studied. Interesting work is contributed on the pathological conditions of the small intestine and in such studies frequent examinations must be made. It is pointed out that regional ileitis cannot be excluded by radiological examination.

An informative chapter is included on the post-operative appearances in gastro-duodenal disease. Hiatus hernia is dealt with comprehensively and is very well illustrated.

The technique of colonic examination is given in detail and it is stressed that preliminary preparation by aperient and by colonic lavage must be carried out in a most thorough manner.

The authors consider the chief value of colonic radiology in constipation and stasis, is in differentiating functional stasis from the organic obstructive lesion.

Diverticula are reported as being present in 10% of individuals examined, but only 2·3% show evidence of diverticulitis. It is rarely seen in persons under forty years of age. Enema examination is preferable to the meal in its investigation. Radiology is not considered to be of great value in rectal investigations—digital and sigmoidoscopic methods are preferred.

A special chapter of this work is devoted to conditions of the alimentary tract in infants and children.

After describing the anatomy and physiology of the biliary tract the author describes a method of examination which tends to demonstrate the biliary ducts. Excellent illustrations are given of the various pathological conditions as well as of the congenital gall-bladder abnormalities.

The spleen, pancreas and adrenal glands may at times be examined radiologically, but these examinations are not of great help.

[1] "A Text-Book of X-Ray Diagnosis by British Authors", in four volumes, edited by S. Cochrane Shanks, M.D., F.R.C.P., F.F.R., and Peter Kerley, M.D., F.R.C.P., F.F.R., D.M.R.E.; Second Edition, Volume III; 1950. London: H. K. Lewis and Company, Limited. 9¼" × 6¼", pp. 846, with 694 illustrations. Price: 70s. net.

A large amount of space is given to radiology in obstetrics and many famous men contribute articles. The methods described are of great value in demonstrating the fœtal position, multiple pregnancy and fœtal abnormalities and also in gaining knowledge of the fœtal-pelvic proportions, but there is still much to learn in this field. Radiology must be regarded as auxiliary to clinical investigation.

The urinary tract examination is considered most valuable and the technique usually employed is still unchanged. The authors advise the use of compression devices for these examinations. The illustrations of normal and abnormal renal conditions are of the highest quality.

Altogether this work must be looked upon as the most complete and valuable work that has ever been produced, and it has been a memorable achievement to get so many high authorities to contribute to its pages. It is a work that can be looked upon as indispensable to all radiologists.

HOW CHEMISTRY WORKS.

A NEW ADDITION to the Introduction to Science series published by Sigma is "How Chemistry Works", by Arthur J. Birch, a graduate of the University of Sydney and now a research fellow at Oxford.[1] This work is not a text-book in any sense of the term and it is written to explain to laymen generally, the how and why of modern chemistry. The writer's chief interest is in organic chemistry, and so this book deals with this section as well as with the inorganic aspect of the science. As stated in the preface, the answers to such queries as how chemistry has become a science, how a chemist can handle with certainty particles so small that he cannot see them, how laboratory processes are translated to an industrial scale, and many other similar problems, are fully expounded in simple terms so that the unravelling of these chemical mysteries is both instructive and entertaining to laymen. The book is necessarily historical and yet deals more with principles than personalities, since the individual scientist matters less than his ideas. This book is sure to prove a popular addition to the series.

THE RHESUS DANGER.

"IN England and Wales during the year 1947, 664 infants died from hæmolytic disease of the newborn." This is the opening sentence of a small book entitled "The Rhesus Danger: Its Medical, Moral and Legal Aspects", by Dr. R. N. C. McCurdy.[2] It is a sincere, thoughtful book; the writer has evidently pondered very deeply over the problems he discusses. The reason for his doing so is mentioned unobtrusively in the introductory chapter; the book "is written by one who must himself make up his mind on many of these questions because a child of his was among the 664 and another will be numbered among those who died from the same cause in 1948". Clearly and simply written, this little book is apparently intended for the lay reader; in particular for parents who are faced with the same problem as the author himself. In an introductory chapter some relevant statistics are quoted and it is shown that hæmolytic disease, as a cause of neonatal deaths, has become relatively more important since most other causes of infant mortality have been eliminated. The subject matter is divided into parts; part one deals with the medical background, while part two, entitled "The Rhesus Problem: Some Wider Issues", consists of short discussions of contraception, sterilization, abortion, adoption of children, artificial insemination and divorce. These subjects are considered as possible solutions of the difficulties confronting families affected by rhesus incompatibility. The author discusses them as impartially as possible and does not obtrude his own opinions unduly. One feels, however, that he regards most of these possible solutions of the rhesus problem as meretricious and inherently dangerous, and that he admits, sorrowfully enough, that there is no easy way out of the situation. "Married couples", he writes, "may remember that they accepted one another 'for better, for worse' and be prepared to abide by that pledge, or (on the other hand) they may feel that 'children are the purpose of marriage, and to hold people to a childless marriage, is a cruel cheat' (Russell, 1949)." The legal questions involved are clearly presented. The book is well documented, a list of references to medical literature is given, and there is a good index.

[1] "How Chemistry Works", by Arthur J. Birch, M.Sc., D.Phil.; 1949. Sydney: Walter Standish and Sons. 7¼" × 5", pp. 224, with 36 illustrations. Price: 8s. 6d.

[2] "The Rhesus Danger: Its Medical, Moral and Legal Aspects", by R. N. C. McCurdy, M.B., Ch.B., D.P.H.; 1950. London: William Heinemann (Medical Books), Limited. 7¼" × 5", pp. 146. Price: 5s.

Books Received.

[The mention of a book in this column does not imply that no review will appear in a subsequent issue.]

"Injuries to the Ankle", by J. Grant Bonnin, M.B., B.S. (Melbourne), F.R.C.S.; 1950. London: William Heinemann (Medical Books), Limited. 8¾" × 5½", pp. 432, with many illustrations. Price: 63s.

The book deals with "details of recent trauma to the ankle, its mechanism, varieties and treatment", and is based on the results of observations extending over ten years.

"Progress in Gynecology", edited by Joe V. Meigs, M.D., and Somers H. Sturgis, M.D.; Volume II; 1950. New York: Grune and Stratton, Incorporated. 9" × 6", pp. 842, with many illustrations. Price: $9.50.

Volume I was published in 1947; there are 78 contributors.

"Dible and Davie's Pathology: An Introduction to Medicine and Surgery", by J. Henry Dible, M.B. (Glasgow), F.R.C.P. (London); Third Edition; 1950. London: J. and A. Churchill, Limited. 9½" × 6½", pp. 980, with 417 illustrations, including nine plates in colour. Price: 54s.

Written primarily for "the medical student of the processes of disease".

"The Springs of Conduct: A Neuro-psychological Study", by Sir John Parsons, C.B.E., F.R.C.S., F.R.S.; 1950. London: J. and A. Churchill, Limited. 7¼" × 4¾", pp. 116. Price: 7s. 6d.

An essay in which the author urges "the importance of the greatly increased knowledge of the functions of the nervous system with respect to human conduct".

"Recent Advances in Physical Medicine", edited by Francis Bach, M.A., D.M. (Oxford), D.Phys.Med.; 1950. London: J. and A. Churchill, Limited. 8" × 5½", pp. 512, with 93 illustrations. Price: 27s. 6d.

There are 33 chapters by 38 contributors.

"Principles of General Psychopathology: An Interpretation of the Theoretical Foundations of Psychopathological Concepts", by Siegfried Fischer, M.D.; 1950. New York: Philosophical Library, Incorporated. 8½" × 5½", pp. 356. Price: $4.75.

The author's aim is to stimulate the student to see the problems of the subject.

"Orthopædic Surgery", by Walter Mercer, M.B., Ch.B., F.R.C.S. (Edinburgh), F.R.S. (Edinburgh), with a foreword by Sir John Fraser, Bart., K.C.V.O., M.C., F.R.S.Ed., F.R.C.S.Ed., M.D., Ch.M., F.R.A.C.S., F.A.C.S.; Fourth Edition; 1950. London: Edward Arnold and Company. 9" × 5½", pp. 1032, with many illustrations. Price: 50s.

Originally based on lectures and clinics on orthopædic subjects.

"Pain and Its Problems", edited by Sir Heneage Ogilvie, K.B.E., D.M., M.Ch., F.R.C.S., and William A. R. Thomson, M.D.; The Practitioner Handbooks; 1950. London: Eyre and Spottiswoode, Limited. 8½" × 5½", pp. 200. Price: 12s. 6d.

Most of the chapters are articles reprinted from *The Practitioner*.

"Illustrations of Bandaging and First-Aid", compiled by Lois Oakes, S.R.N., D.N. (Leeds and London); Fourth Edition; 1950. Edinburgh: E. and S. Livingstone, Limited. 8½" × 5½", pp. 320, with 370 illustrations. Price: 8s. 6d.

The section on war wounds of the previous edition has been replaced by a section on "Elastoplast" and its method of application.

The Medical Journal of Australia

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All articles submitted for publication in this journal should be typed with double or treble spacing. Carbon copies should not be sent. Authors are requested to avoid the use of abbreviations and not to underline either words or phrases.

References to articles and books should be carefully checked. In a reference the following information should be given without abbreviation: surname of author, initials of author, year, full title of article, name of journal without abbreviation, volume, number of first page of the article. If a reference is made to an abstract of a paper, the name of the original journal, together with that of the journal in which the abstract has appeared, should be given with full date in each instance.

Authors who are not accustomed to preparing drawings or photographic prints for reproduction are invited to seek the advice of the Editor.

THE PREVENTION OF BLINDNESS.

ON previous occasions reference has been made in these columns to the prevention of blindness and to the surveys carried out by Dr. J. B. Hamilton into blindness in Tasmania. A plea has been made for the carrying out of a survey of blindness in all the States of the Commonwealth. It is to be hoped that the National Health and Medical Research Council will allocate money for ophthalmological surveys, but no indications have been given of its intentions in this direction. For the moment this does not matter; our intention is first of all to remind readers of the discussion which took place on Dr. Hamilton's latest survey at the seventh session of the Australasian Medical Congress (British Medical Association) at Brisbane last June, and secondly to bring to their notice a report on the causes of blindness in England and Wales, written by Arnold Sorsby and issued by the Medical Research Council of Great Britain.[1]

At Brisbane Dr. Hamilton dealt with figures derived from an examination of 14,560 private patients and compared them with those obtained from 6770 examinations made in Tasmania in 1938. He found that the rate of binocular blindness had dropped from 1·8% to 0·71% in ten years, and that the rate of monocular blindness had fallen from 7·5% to 2·9% in the same period. On the other hand the number of blind civilian pensioners in Tasmania and the number of blind war pensioners had increased from 179 to 181 and from six to 13 respectively. He found that the leading causes of blindness in Tasmania were still cataract and glaucoma, and sometimes a combination of both. Glaucoma was responsible for 14·4% of the total amount of binocular blindness. Among juveniles congenital cataract seemed to be the only serious disease remaining to be contended with and this, coupled with senile cataract, accounted for almost 26% of the blindness in Tasmania. The proportion of binocular blindness due to industrial trauma had dropped from 10·6% to 3·84%. In the discussion which followed the presentation of Dr. Hamilton's paper, Dr. E. O. Marks, of Brisbane, said that there should be records not only of blindness, but of the incidence of eye diseases and injuries. He pointed out that even at the Brisbane General Hospital no such record was kept and that even the patient's history cards were destroyed after a short time. He thought that accurate figures for the whole Commonwealth should be obtained.

In Great Britain the actual number of blind persons cannot be determined. There is a register of blind persons, but registration is not compulsory. The register was started after the passing of the *Blind Persons Act* of 1920. This Act provided statutory advantages for the registered blind—they could secure an old age pension on reaching the age of fifty years and could obtain certain domiciliary assistance. At first all that was required for registration was a certificate from any medical practitioner that the person was blind. Registration, however, has become more stringent and for some years most local authorities, which are the bodies responsible for the registration of blind persons, have accepted only certificates from ophthalmologists. For fifteen years most authorities have insisted on the use of a comprehensive and somewhat complicated form, which is reproduced in the memorandum. It is of interest to note that the form is criticized and that attention is drawn to several of its weaknesses. What is more important is that the competence of different examiners has varied considerably. Generally speaking, certificates completed by full-time ophthalmologists have left little to be desired; on the other hand the certificates of part-time ophthalmologists have given a good deal of trouble, as the factual information supplied is often too incomplete to allow an adequate diagnosis to be made. These observations should be borne in mind when any Australia-wide survey is undertaken. The definition of blindness was discussed in our last editorial mention of this subject on July 24, 1948. In the English memorandum it is stated that the *Blind Persons Act* of 1920 regarded blindness in children as inability to read ordinary school books, and in adults blindness meant inability to do any work for which eyesight is essential. In practice this double definition gave rise to difficulty when some children brought up in blind schools ceased to be regarded as blind when they left school, for their sight was not so poor as to debar them from performing "any work for which eyesight is essential". Such a young adult clearly would not be able to compete with normally sighted persons for employment (requiring sight) for which he had not been trained. Sorsby (the author of the memorandum) suggests a raising of the level of blindness required for registration and certification into two categories—(*a*) those persons blind by a stringent standard and certifiable on exclusively ophthalmological considerations, (*b*) those blind vocationally and certifiable on combined ophthalmological and industrial considerations. He makes the important statement that the concept of vocational blindness should not seem a startling innovation for "it carries into ophthalmology the premises of rehabilitation with its undoubted benefits to the individual and society". In England and Wales there were in 1947 76,004 registered blind persons and the population was 43,270,000; the blindness rate was thus 175·6 per 100,000. Since registration is voluntary and

[1] "The Causes of Blindness in England and Wales", by Arnold Sorsby; Medical Research Council of the Privy Council, Memorandum Number 24; 1950. London: His Majesty's Stationery Office. 9¼" × 6", pp. 42. Price: 1s. 6d. net.

not fully effective, the rate stated is an under-estimate, possibly by as much as 15% or 20%. The rate is therefore about 200 per 100,000.

Sorsby divides the causes of present-day blindness into major, intermediate and lesser groups. Among the major causes are cataract; glaucoma; myopia; congenital, hereditary and developmental defects; and infectious diseases. Probably some 25,000 people in England and Wales are blinded by glaucoma, myopia and the congenital anomalies, and Sorsby finds no reason to assume any reduction in this incidence in the immediate future. Some 20,000 persons are blind from cataract and this number "could be reduced by at least a third if existing methods of treatment were utilized to the full". In the "fairly recent past" the infectious diseases produced some 10,000 of the cases of blindness; in the near future "such a figure may seem as much past history as blindness from smallpox had become by the end of the last century". Under intermediate causes are inflammatory affections, senile macular degeneration, optic atrophy, corneal lesions, vascular disease, diabetes and trauma. In the cases analysed by Sorsby these accounted for 25·8%, giving a computed number of some 19,000 blind persons. Lesser causes accounted for 3·2% of all cases, some 2000 persons being affected. Sorsby can find no reason for expecting a reduction in either of these two groups. His outlook for the future is, he admits, gloomy. "With full allowance for a continuing decline in the frequency of blindness from infectious diseases and for the possible elimination of a substantial proportion of blindness from cataract, an optimistic assessment would still leave over 50,000 irremediably blind in the country."

Gloom and pessimism are not of much use to individuals, to a profession or to a community. They imply, if they do not carry with them, inaction. If we try to do something we shall be optimistic. Two things can be done in Australia. One is the initiation of a survey to discover the magnitude of the problem that has to be faced and at the same time to awaken the public to the importance of the undertaking. The second was mentioned at the Brisbane congress—to press for the establishment of university chairs in ophthalmology. This must be done with the object of directing research into the many dark corners in ophthalmology where lie hidden the root causes of such conditions as glaucoma, cataract, inflammatory diseases and the degenerative processes found in old people.

Current Comment.

A STUDY OF DIPHTHERIA.

THE adoption of mass immunization against diphtheria brings its own problems, and the danger exists that apparent anomalies may, quite unfairly, bring discredit on the practice. However, despite practical and academic points that can be advanced to temper excessive enthusiasm for mass immunization, public health authorities have, in general, been well satisfied with the results obtained. This makes it all the more important to deal with the anomalies, among which is the development of diphtheria infection by some who have received an adequate course of inoculation. Light is thrown on this question in one of the latest of the special report series issued by the Medical Research Council.[1] In 1939 the Preventive Medicine Committee of the Medical Research Council established a subcommittee to deal with certain matters arising out of the campaign for mass immunization that was then being advocated as a national policy. Medical officers of health agreed to collect information on the technical methods used and on the results of various forms of propaganda. In return the subcommittee offered to make a special bacteriological and immunological study of material from cases of diphtheria in inoculated persons, in the hope of explaining why immunization had been unsuccessful in conferring complete protection against the disease. The occurrence of an unusually severe form of diphtheria on Tyneside and at Dundee, in which 30% to 50% of the cases occurred in inoculated members of the community, provided the opportunity for intensive investigations, which were undertaken by two independent groups of workers. The Medical Research Council Special Report contains a record of their findings with discussion of the implications especially for future policy.

A team of five workers led by Sir Percival Hartley investigated the position on Tyneside. It was found that most uninoculated persons who developed diphtheria had little or no circulating antitoxin; but contrary to expectation quite a considerable proportion of cases occurred in inoculated persons who, judged by the antitoxin content of their serum, would normally be expected to be free from attack. These cases, however, tended to be much milder than in the uninoculated; the higher the patient's antitoxin content, the less serious, on the whole, was the disease, and among the fully inoculated not a single death occurred. The antitoxin titre of inoculated persons who developed diphtheria rose rapidly within a few days of onset of the disease, even if it was low in the early stages; infection stimulated the immunizing mechanism so effectively that a far higher level of circulating antitoxin was attained than could have been reached by the therapeutic injection of antiserum.

The Dundee investigation was carried out by Professor W. J. Tulloch and three others, and many of the results obtained were similar to those of the Tyneside team, although neither of the two groups was aware of the simultaneous investigation of the other till the work was well advanced, and the respective approaches differed considerably. One important finding of Tulloch and his colleagues was that inoculated persons who developed diphtheria had, on the average, a lower antitoxin content than inoculated persons who did not develop the disease; the variation in response of the individual appeared to be almost as great as the variation in antigenic potency of different makes or batches of diphtheria prophylactic. The last point is worth bearing in mind if the prophylactic agent is not to be discredited. It is admitted that to a limited extent "a poor antigen would be better than none", because it might establish an immunizing mechanism that would respond when infection took place and at least modify the attack; on the other hand, the use of the most active and effective antigens appears highly desirable in the light of evidence that it is those who respond feebly to inoculations who contract diphtheria.

It is pointed out in the preface to the report that the observations recorded, besides being of interest to students of immunology, may have important practical bearings. They show that, at a time when its incidence was rapidly falling over the greater part of the country, diphtheria was prevalent in epidemic form in two areas where inoculation was being extensively practised. It is not clear how much this was due to the prevalence of particularly virulent forms of the *gravis* type of diphtheria bacillus and how much to imperfections in present-day

[1] "A Study of Diphtheria in Two Areas of Great Britain, with Special Reference to the Antitoxin Concentration of the Serum of Inoculated and Non-Inoculated Patients and Other Persons; and the Relation of This to the Incidence, Type and Severity of the Disease"; Privy Council, Medical Research Council Special Report Series Number 272; by Percival Hartley, W. J. Tulloch, M. Anderson, W. A. Davidson, J. Grant, W. M. Jamieson, C. Neubauer, R. Norton and G. H. Robertson; 1950. London: His Majesty's Stationery Office. 9¼" × 6", pp. 166. Price: 4s. net.

inoculation methods; but in neither area did the epidemic begin to decline until well over 50% of the juvenile population had been inoculated. They further show that, in a population with a low level of immunization, diphtheria is quite likely to occur among the inoculated subjects themselves, though not in severe form and practically never with a fatal outcome. However, as is rightly commented, the fact that it may occur at all under such conditions is a warning that cannot be neglected. Should the very success of a campaign lead to a decrease in the demand for immunization, the proportion of protected persons would drop to a level at which not only the population of a few unfavourably situated towns would fall victims to the disease, but large parts of the country would be vulnerable. The danger of such a situation is emphasized, for whereas vaccination against smallpox becomes effective in a few days, immunity against diphtheria takes some weeks to develop. The only members of a community exposed to diphtheria who can expect protection at short notice—apart from those receiving the temporary and less dependable protection from therapeutic antiserum—are those who have been inoculated in earlier life. Such persons respond quickly to a further injection of toxoid and also, as the report shows, to the diphtheria bacillus itself, so that in either instance their safety is assured in a few days. With the decline in incidence of diphtheria and consequent decrease in number of those developing immunity through subclinical infection, the significance of inoculation in providing the individual with the means of rapid protection is greatly increased. Parents need to be made to realize that active immunization in the first year of life and reinforcing doses of prophylactic in later years are just as necessary in the absence of diphtheria epidemics as in their presence. Unless the proportion of the immunized population is kept up to the 75% level, protection against epidemic diphtheria cannot be reasonably assured.

These comments, most of which are made in the preface to the report, do not, of course, bring forward much that is new. Many of them have been long appreciated by those with either an academic or a practical interest in immunization. However, their relevance to a contemporary situation and a recent investigation more than justifies their statement or restatement. Moreover, they lead to the making of some important practical points on the prophylactic material. Attention is drawn to the conceivable situation in which, owing perhaps to a long period of comparative freedom from the disease, stocks of material essential to combat a sudden and widespread epidemic might become unduly low. Modern methods of preparation of therapeutic substances in the dry stable condition make it possible to lay down stocks of antiserum and of purified diphtheria toxoid, but it would be too late to do this when an epidemic had arrived. The other point raised is the problem of improving diphtheria prophylaxis sufficiently to ensure the establishment and maintenance of a high level of immunity in the inoculated subject. Implicit in the report, the preface concludes, is the suggestion that antitoxin is not the only mechanism of defence against the diphtheria bacillus, and the failure of the present prophylactic agents always to provide complete protection against diphtheria may be due to some deficiency in the antigen. "If this can be remedied, it should become possible to produce as sound an immunity against diphtheria as was achieved against tetanus in the Defence Forces of the Allies during the second world war"—a remarkable and enviable achievement that is now history.

BLOOD PRESSURE STANDARDS.

MUCH discussion, with a good deal of disagreement, has centred around the range of blood pressure values to be regarded as normal and the interpretation of values beyond that range. Not the least of the issues involved is the patient's peace of mind. The latest attempt to clear the air has been made by A. M. Master, L. I. Dublin and H. H. Marks.[1] They have examined data from 15,706 persons in eleven industrial plants and army airfields (civilians only), and compiled a table which aims to indicate, by sex and age groups from sixteen to sixty-five years, the hypotension upper limit, the normal range and the hypertension lower limit for systolic and diastolic blood pressures. This table should be useful provided heed is paid to the injunction of its compilers, that it be used sensibly and not too literally. As they point out, the whole clinical picture must be taken into account; a single isolated factor can be misleading. Another point they make is that there is a difference of approach between that required for life insurance purposes and that of the clinician. The life insurance body is obliged to be guided by group figures and averages in estimating longevity, although it is realized that the individual member of the group will not necessarily conform. The clinician on the other hand must be concerned with the individual. The results of life insurance studies have value for clinicians in that they indicate blood pressure levels which should put the clinician on the alert for signs of cardio-vascular impairment. That is what matters. The investigations of Master and his colleagues suggest that blood pressures which are usually considered above normal are not uncommon up to the age of forty years and that after the age of forty-five years they are more frequent than so-called normal readings. At ages of fifty-five or sixty years and above, they state, systolic pressure of 180 or even 190 millimetres of mercury and diastolic pressure of 100 or even 110 millimetres of mercury should not *ipso facto* be considered abnormal. These readings may merely reflect the degree of arteriosclerosis present, especially as part of the aging process; the presence of malignant hypertension or hypertension secondary to renal or other disease is, of course, another matter. It is suggested, however, that a blood pressure reading at the lower limit of hypertension or higher may well be considered abnormal until proved otherwise; complete examination is indicated. On the relationship of hypertension to coronary artery disease and occlusion and of both to cardiac enlargement, the views of Master and his colleagues are interesting. They consider that the relationship requires reinvestigation, as there is a good deal to suggest that it may be coincidental, particularly when the age factor is taken into account. Their table may, as they mention, be useful in such an investigation. The figures suggested for the upper limits of hypotension are of interest, as a good deal of uncertainty exists here. It would, however, be misleading to try to quote them, just as it would be for those for hypertension; the table needs to be consulted as a whole. It appears to offer a useful guide, if not misused, and to be able to stand up to a good deal of criticism unless that criticism is based on correspondingly extensive data. If the suggestions of Master, Dublin and Marks are accepted the effect will be widespread. For example, as they point out, industrial medicine will have to take notice of the modifications. Voluntary health and accident insurance schemes will be affected, as will workmen's compensation provisions. Standards for enlistment, reclassification and retirement in the services may need reconsideration. Medical research may be interested in the standards proposed, and they are certainly of interest to the clinician. They have a considerable bearing on the indications for treatment in the presence of blood pressure readings that may be considered abnormal by present standards. There is no attempt, it should be emphasized, on the part of Master and his colleagues to set up dogmatic standards, but rather the contrary. They are well aware of the undue importance that is often attached to blood pressure readings and of the primary importance of general examination of the patient. Their table has the double virtue of providing a detailed scale of values that can be used as a definite basis of consideration and at the same time allowing sufficient range to loosen the shackles with which too often an awe for blood pressure readings has bound practitioner and patient.

[1] *The Journal of the American Medical Association*, August 26, 1950.

Abstracts from Medical Literature.

RADIOLOGY.

Mobility of the Recto-Sigmoid Colon.

GEORGE LEVENE AND ERNEST A. BRAGG, JUNIOR (*Radiology*, May, 1950), state that the anatomical support of the recto-sigmoid colon is such as to allow a degree of movement of these segments of the large intestine. Mobility is well demonstrated in lateral X-ray films taken before and after evacuation of a barium enema. Normally, in a distended bowel, the rectum lies close to the hollow of the sacrum and the recto-sigmoid junction is close to the sacral promontory. After evacuation of an enema, the upper rectal ampulla and sigmoid fall away from the spine. Failure of these segments to move is usually an indication of disease in the pelvis, which may originate in the colon or other pelvic viscera. Restricted mobility of the recto-sigmoid colon is thus a useful radiological sign which contributes to the diagnosis of disease in the pelvis. It also helps to define the extent of a carcinoma of the rectum or sigmoid colon.

Cephalohæmatoma in the Newborn.

M. D. INGRAM, JUNIOR, AND W. M. HAMILTON (*Radiology*, October, 1950) state that cephalohæmatoma must be considered in the presence of any soft-tissue tumefaction of the skull in the newborn infant. Among these disorders are encephalocele, subcutaneous hæmatoma with depressed fracture, and *caput succedaneum*. Occipital encephalocele may simulate cephalohæmatoma closely. Confusion in diagnosis does not occur in the other bones because they are not mid-line in position, although it must be pointed out that rare instances of lateral encephalocele have been reported. X-ray study in encephalocele reveals a soft-tissue tumour with an osseous defect in the mid-line of the calvarium. There is no calcification in the base of the tumour, such as is seen in the early calcifying hæmatoma. In cephalohæmatoma there is no osseous defect, and after two or three weeks there is usually a faint rim of calcium at its base. The most important thing in the differential diagnosis of cephalohæmatoma is the fact that its boundaries are limited by the periosteum of the individual bone involved. In the parietal region it is never seen to extend across the mid-line.

Traumatic and Related Types of Diaphragmatic Hernia.

F. ISAAC, F. B. WILKINS AND J. WEINBERG (*Radiology*, October, 1950) state that diaphragmatic herniæ are frequently encountered in modern radiological practice. By far the most common variety is the œsophageal hiatal hernia. The non-hiatal herniæ are frequently caused by direct trauma with actual laceration of the diaphragm, although some occur through preexisting congenital weak spots or as a result of absence of portions of the leaf. Diaphragmatic herniæ are often asymptomatic and may go undiagnosed for considerable periods of time. The non-hiatal herniæ frequently masquerade as other pulmonary or pleural lesions in the basal portion of the left lung field. Pure omental herniæ, as a rule, will present themselves as well marginated, spherical masses just above the diaphragm. Whenever a deformity of the left hemidiaphragm is demonstrated in the chest film, or there is an unexplained density in the left lung base partially obscuring the diaphragm without other evidences of pulmonary infection, the possibility of diaphragmatic hernia should be considered.

Intestinal Obstruction and Direct Radiography.

J. H. MIDDLEMISS (*The British Journal of Radiology*, January, 1949) discusses the various forms of mechanical and adynamic obstruction of the small bowel. He states that mechanical obstruction of the small bowel presents a characteristic appearance. The film with the patient erect shows horizontal fluid levels in the loops of small bowel; arching upwards above these horizontal fluid levels gas is seen in the loops, and this gas-filled bowel may be distended to a greater or lesser degree. Small bowel is recognized by its site and by the structure of the part of bowel visualized. If the gas-filled loops are not much distended they will probably be central in disposition, jejunal coils in the upper part of the abdomen, ileal coils in the lower part of the abdomen and pelvis. These smaller loops usually have sharp hair-pin turns. The coils of gut may, however, be much distended and stretch in wide sweeping arcs from one flank to the other; the loops are often arranged symmetrically, one below the other, the whole apparently filling the entire abdomen. Distension of the jejunum causes distension of the mucosal folds or *valvulæ conniventes*, so that these lose their normal appearance and become stretched, giving a step-ladder appearance or the impression of a spring ready to uncoil. This appearance of the jejunum is characteristic and makes possible its easy recognition under most circumstances. The upper part of the ileum contains few and the lower part of the ileum contains practically no circular mucosal folds, and thus distension of the ileum produces a pattern of smooth-walled tubes quite unlike the step-ladder appearance of the jejunum, though in the upper part of the ileum the occasional indentation of mucosal folds may be demonstrated. It is often difficult to differentiate between distended ileum and pelvic or sigmoid colon. Multiple small coils tend to be ileal, and the presence of jejunal distension suggests that coils of intestine in the pelvic region are ileum; the presence of undistended caecum and upper part of the colon may help to interpret the pelvic shadows; loops of pelvic colon are not often multiple and tend to be vertical in disposition and towards the left iliac fossa rather than the right, whereas ileal loops are usually transverse in direction and are often multiple. In acute obstructions vigorous peristalsis is or has been present in an effort to overcome the intestinal block. This tends to cause the gas to collect in fewer and larger loops, and thus large loops of gas-distended small bowel containing fluid levels, and stretching in wide arcs from flank to flank, are diagnostic of acute intestinal obstruction. Further evidence of peristalsis may be given by blurring of one or more loops, which are undergoing active peristalsis at the time of exposure. Chronic obstructions do not produce these same large side-to-side loops, but it does not hold because the loops are few and small, and possibly not greatly distended, that chronic and not acute obstruction is present. Acute obstruction may well present these same appearances, and the differentiation between acute and chronic conditions is not within the realms of radiology, though there are signs diagnostic of the acute condition. With the patient in the supine position, the most dependent part of the distended bowel is the lower or posterior part of the lumen of the intestine; this being the case, the fluid content gravitates to that part, allowing the passage of gas above the fluid level, that is, in the upper or anterior part of the bowel lumen. Thus, broadly speaking, gas will be present in all that part of the intestine proximal to the obstruction, and a radiograph will or should demonstrate the gas in all that distended part of the bowel; provided that these gas shadows can be correctly interpreted, some idea can be obtained of the most distal part of distended bowel in which gas is present. This most distal part is obviously in the region of the obstructive lesion, and it is possible in many cases by thus correlating the data from the erect and supine films to give a reasonably accurate localization of the site of obstruction. Identification and localization of large-bowel obstruction are carried out in precisely the same manner, that is to say, by primarily establishing a diagnosis of stasis, and then identifying gas shadows so as to localize the furthermost point of intestinal distension. The picture presented depends to a large extent on the competence of the ileo-caecal sphincter. If this valve continues to function normally, distension remains confined to the large bowel. Frequently in slow-growing low colon obstructions, the large bowel proximal to this site becomes distended to a very considerable degree as far back as the caecum. In high obstructions of the colon and in those with a more acute onset, incompetence of the ileo-caecal valve may occur, and as this remains patent, the stasis and distension proximal to the obstructive lesion may involve considerable stretches of the small intestine. In these cases the distension demonstrated in the small bowel may reach proportions quite equal to those due to small-bowel obstructions. Traumatic neurogenic ileus occurs in mild and varying form after almost every laparotomy. It manifests itself as a diffuse distension which may be local or generalized, and is segmental in character. The X-ray appearance shows loops of small and large bowel distended with gas to a varying degree, scattered as it were throughout the abdomen. It may be local in character, involving small or large bowel in one particular segment; or it may be generalized, involving the entire intestine. The distension may vary, from the size of the normal lumen of the bowel, to very great dilatation. The presence of fluid levels is a variable factor—in the early stages the distension may be entirely gaseous. Peristalsis does not occur, and no blurring due to peristalsis is demonstrated; indeed subsequent radiographic examinations within the hour show little change in the relative positions

of the distended loops, and as peristalsis is absent there is no tendency, as there is in mechanical obstruction, for the fluid levels to collect in fewer and larger loops. In this condition also, the loops of bowel tend to be more gradually curved and do not show the hair-pin turns associated with mechanical obstruction. Inhibition ileus associated with peritonitis may also produce characteristic signs. In the early stages when the peritoneal infection is localized, the appearance on the film may be one of a few loops, even a single loop, of gas-distended bowel, with fluid levels. Associated with this, due to the peritoneal reaction, may be a local disappearance of the properitoneal fat line, this deficient part of the line corresponding to the region of peritonitis. If the peritonitis spreads and becomes generalized, more bowel becomes distended; the loops of bowel contain gas and fluid levels, and in distribution are scattered throughout the abdomen; they also tend to present gradual shallow curves, rather than hair-pin turns. Evidence of peristalsis is absent. If the peritoneal fluid is extensive, an increased density may be present between the loops of bowel, producing a "layering" effect between the coils. The properitoneal fat line may be entirely absent.

Malacia in Transcervical Fractures of the Talus.

W. J. COSGROVE (*American Journal of Roentgenology*, March, 1950) states that fracture through the neck of the talus (astragalus) is a relatively infrequent injury. So-called aseptic necrosis in the body of this bone with subsequent degenerative arthritic change is observed as a sequela quite often, especially when associated with subtalar dislocation. Radiographic examination of the ankle and foot at the time of injury reveals the fracture line as a narrow radiolucent band through the neck of the talus. Absence of displacement in the fragments is unusual; dislocation at the posterior compartment of the subtaloid joint should be especially sought. Overlooking a subluxation is a serious matter, since in 50% of such cases the patients develop traumatic malacia and permanent crippling of the foot may result. An equinus position of the body may be present. Flake-avulsion fractures in the lower part of the tibia and fractures through the fibular malleolus may be observed, as well as tibial malleolar fractures. Gross dorsal displacement of the body is readily recognized, with the body lying on the inner aspect of the *tuber calcanei* and the fracture surface directed laterally. The antero-posterior and lateral views of the ankle and foot are supplemented at times by a view with the foot in full plantar flexion. At approximately eight weeks, the fracture line in the uncomplicated case usually remains discernible, although it may be completely obliterated. Diffuse osteoporosis is present, involving the body and neck of the talus and surrounding bony structure due to their intact circulation. Little or no dislocation is noted. When "traumatic malacia" of the body develops, X-ray films in eight weeks or more reveal the body as a dense well calcified structure. Osteoporosis in surrounding osseous structures is dramatically portrayed, since their intact circulation has removed almost all the calcium content; whereas the body with its interrupted circulation retains the calcium content present at the time of the injury. The talar fragments when manipulation has been successful show a relationship to each other and to surrounding structures as would be anticipated in the average normal. In others, however, persistent subluxation or even gross dislocation is observed at this time. One must not confuse the malleoli superimposed on the body of the talus as evidence of aseptic necrosis—the normal density of this area always being three times that of adjacent bone. In doubtful cases X-ray pictures should be obtained in which no overlapping of bone shadows is present before an opinion is given. As is customary in other lesions involving growing epiphyseal bones, views of the normal side should be obtained. Subsequently revascularization may occur and seems dependent upon immediate reduction and accurate approximation of fragments, immobilization in plaster and protection from weight-bearing for many months. The time interval is apparently shortened somewhat by early subtalar arthrodesis.

PHYSICAL THERAPY.

Therapeutic Uses of Radioactive Isotopes.

R. J. WALTON (*The British Journal of Radiology*, September, 1950) states that for therapeutic purposes at the Royal Cancer Hospital three isotopes have been used—Na^{24}, I^{131} and P^{32}. Na^{24} has been used in a spherical rubber bag to irradiate the mucosa of the bladder. An attempt is being made to develop a technique for treatment of lesions in which there is malignant or pre-malignant change over a large part of the mucosa without much infiltration. The bag is inserted into the bladder (after a biopsy) *per urethram* in the female, and by a perineal urethrotomy in the male. The bag is filled with sodium iodide solution, and radiographs are taken. This is to determine the amount of fluid required to distend the bag. The bag is then emptied and refilled with active solution. In a typical case 300 to 400 millicuries in 150 millilitres would be used. The catheter is clipped off and the patient returns to the ward for the time required to give the desired dose. This is usually three to four hours and depends on the volume of the sphere and the activity of the solution. The patient during this time is a highly active source of radiation, and precautions must be taken to protect the staff. After the required time has elapsed, the bag is emptied and removed, and the urethrotomy is closed (if the patient is a male). The patient remains in hospital a further five or six days. The treatment is well tolerated. Usually pain and frequency of micturition occur during the second week after treatment, but these symptoms subside rapidly. Doses up to 3000*r* of γ radiation have been given and appear to produce a satisfactory immediate response. With Na^{24} there is also 1·4 times this dose of β radiation at the surface of the bag, but at depths greater than two millimetres this is negligible. The therapeutic use of I^{131} has been confined to those cases of carcinoma of the thyreoid in which the tumour takes up iodine and is not capable of treatment by other methods, by reason of dissemination. First a diagnostic dose of 50 to 100 microcuries of I^{131} is given by mouth. If the tumour is shown to take up iodine, a therapeutic dose is then given. The amount varies, but has been as high as 230 millicuries. The use of P^{32} in *polycythæmia vera* is now well known. In addition, it is being tried in rapidly growing, widely disseminated, radiosensitive tumours. Patients with chronic leuchæmia, lymphosarcoma, anaplastic carcinoma and neuroblastoma may receive palliation from quite small doses. Doses are regulated by clinical response and also in part empirically. As an example, a patient suffering from chronic leuchæmia, with ascites, pleural effusion and œdema of the legs, responded well to doses of one millicurie given weekly for six doses. He has remained well for nine months.

Radioactive Isotopes in a Case of Multiple Melanomata.

R. MARCUS AND J. ROTBLAT (*The British Journal of Radiology*, September, 1950) state that tracer doses of several elements were first used in order to find the isotope with the best uptake. The isotopes used were P^{32}, I^{131} and Cu^{64}. P^{32} was chosen because previous investigators had found that the uptake of P^{32} in superficial melanotic nodules was different from that in the normal skin. An isotope of copper was chosen because of the part it played in the metabolism of melanin and the possibility that the melanin of melanoma might have a high copper content. Cu^{64} was used in the form of colloidal metallic copper; 150 microcuries were given intravenously, and the uptake was measured. The results showed that there was no difference either in the rate of uptake or in the absolute uptake of Cu^{64} between melanoma and normal skin. Most of the activity was concentrated in the region of the liver. It appears that the liver takes up about 82% of the injected copper. The results exclude the use of Cu^{64} for the treatment of melanomatosis, but there may be possibilities for this isotope in treatment of certain diseases of the liver. Radioactive iodine was used incorporated with diiodo-tyrosine. Tyrosine is a precursor of melanin. Radioactive iodine was not taken up specifically by the melanomata. The tracer dose of phosphorus consisted of 170 microcuries of P^{32} injected intravenously. The measurements indicated that practically every melanoma took up more phosphorus than the surrounding skin, the amount varying from four to ten times the normal. In view of these findings two therapeutic doses of P^{32} were given at an interval of one month, the first dose being 5·4 millicuries, the second dose 15 millicuries. Clinical findings in this case were of some interest. After the first dose of P^{32}, necrosis was seen in excised melanomata with clinical evidence of diminution in size of some nodules. After the second dose enlarged axillary glands which had been growing rapidly first stopped enlarging and then diminished in size. The clinical course of the disease did not appear to be altered by P^{32}, but inhibition of growth was obtained. It is possible that a large initial dose might have been more effective. A larger dose was not given because of possible ill effects, but none were observed except possible diarrhœa.

British Medical Association News.

SCIENTIFIC.

A MEETING of the New South Wales Branch of the British Medical Association was held at Broughton Hall Psychiatric Clinic, Leichhardt, New South Wales, on December 7, 1950. The meeting took the form of a series of clinical demonstrations by the medical superintendent, Dr. Guy Lawrance, and members of the staff of the clinic. Part of this report appeared in the issue of December 23, 1950.

Neurosyphilis.

A series of patients were presented suffering from neurosyphilis in various forms. Special reference was made to penicillin and malaria therapy.

Dementia Paralytica.

The first patient, a kitchenman, aged fifty-nine years, had been admitted to the clinic in November, 1949, because of frivolous conduct, great suggestibility, dysarthria, tremors and unsteady gait. He was smiling and fatuous, being not at all worried at his serious predicament, and although his mental faculties were all blunted, he was amenable to hospital control. He claimed constantly that there was nothing wrong with him. His tongue had fine and coarse tremors, his speech was very slurred, and some syllables were elided completely. His limbs were tremulous, his gait was extremely clumsy, and he walked with a very wide base. The pupils were unequal and slightly irregular in outline; the response to light was sluggish, but accommodation reactions were correct. Knee and ankle jerks were briskly active. He had a course of 10,000,000 units of penicillin in oil, 300,000 units being given per day. Five severe malarial rigors only were induced, because his general health was too poor to continue and he became jaundiced. His walk and his speech improved a great deal, his memory became good, and his interests returned. In June, 1950, he had a second course of 10,000,000 units of penicillin, and he became extremely well and was able to conduct a poultry business by himself. As the result of the Wassermann test was still positive, a further course of penicillin had been given in the endeavour to render it negative. The results had been very satisfactory up to date.

The next patient, a married man, aged forty-three years, had been admitted to the clinic because of mental confusion and restlessness. The story was that for a year his personality had been changing. He was bad tempered and irritable and had been abusive. He had become increasingly confused, with full disorientation for time and place. He was rambling in speech, with slurring of many syllables due to elision of parts of words; his tongue had trombone tremors. His pupils were unequal and sluggish in their reaction to light. His knee jerks were grossly exaggerated. He had been totally lacking in insight, but had not up to that time shown any gross delusional state. After serological tests had been carried out, a diagnosis was made of parenchymatous neurosyphilis. A course was commenced of 10,000,000 units of penicillin, 3,000,000 units being given per twenty-four hours, to be followed by a course of malarial therapy when the parasite of therapeutic malaria was available. It was pointed out that they generally used a follow-up of tryparsamide therapy at Broughton Hall, a practice that had been successful for years, but they were carrying out a series of treatments with penicillin and malaria as a test. After the penicillin treatment the patient had made a remarkable improvement, both mentally and physically, as could be seen in his generally correct social behaviour and his fully returned and correctly directed interests and drives. The patient was shown to indicate the great value of penicillin in the treatment of general paralysis of the insane; it would appear that after a course of malaria therapy he should have very fair prospects of making a lasting recovery. Repeated serological examination with more courses of penicillin would have to be arranged for the future unless the results of serological tests became negative. The patient had had a course of eleven malarial rigors and had made a good social recovery.

The next patient, a married woman, aged fifty-nine years, had been admitted to the clinic in March, 1949, because of strong delusions of persecution and hallucinations of voice and smell. Routine serological examinations were carried out and a diagnosis was made of *dementia paralytica*. Her pupils were unequal and irregular and reacted but faintly to light; accommodation was correct. She was given 10,000,000 units of penicillin and malaria therapy. She stood eight good rigors, going to 105° F. and over on each occasion, but the treatment was stopped before the tenth rigor because her spleen began to enlarge too much and her general condition deteriorated. Mentally the patient was not greatly upset; she was a little retarded and depressed by slight fears of her next-door neighbours and said that one of them might hit her. However, she realized that the idea was foolish and so showed good insight. It was considered that she would do very well; she was cooperative and came regularly to the clinic. The comment was made that the onset of the patient's condition had resembled acute paraphrenia; the case illustrated the value of routine blood tests.

The last patient of the group with *dementia paralytica* was a married woman, aged forty-five years, suffering from connubial syphilis. She had divorced her first husband for adultery and remarried five years before her admission to the clinic. The first husband was said to have been syphilitic. She had worked for several years to get extra money for her home, but the second husband took all the credit for their sound finances, and she said that he did not give her the run of his trouser pocket. She was dissatisfied. She wanted no coitus and would desire to live alone. She refused her husband his conjugal right and had collapsed on a few occasions. Her condition had been diagnosed by a psychiatrist as a depressive state and that was all her mental symptoms denoted. The value of a routine blood test was shown by the evidence revealed of syphilitic infection. Examination of the cerebro-spinal fluid showed the presence of neurosyphilis. The patient was given eight malarial pyrexias and 10,000,000 units of penicillin, and was sent home for recuperation. She was mentally very bright. Her husband tried to resume sexual relations, but she could not oblige him and became worried and depressed. She was then taken in for further treatment. Her pupils were irregular, but reacted to light and accommodation. The Romberg test showed unsteadiness in no special direction. The ankle jerks were absent. Her condition was one of casual *dementia paralytica*; the depression brought her to notice and full investigation found out the true weakness. It was pointed out that connubial syphilis was often like that, and it was detected only by routine serological tests. The prognosis was good.

The following further comments were made. The value of the routine blood test was shown. The diagnosis of the condition of a person in her forties with severe personality disorders must be made from phthisis, early encephalitis, neurosyphilis, cerebral tumour and cerebral arteriosclerosis. The position of penicillin in neurosyphilis was not yet fully evaluated; it was the custom at the clinic to follow it up with heat therapy in the form of malaria or electrically produced hyperpyrexia. C. Earle Johnson, writing in *The Journal of Nervous and Mental Diseases* for May, 1949, had given the following summary for termination of chemotherapy: (i) a minimum period of two years after heat treatment; (ii) reasonable mental improvement; (iii) reasonable physical improvement; (iv) satisfactory improvement in results of serological tests of the cerebro-spinal fluid; (v) likelihood of further improvement with prolongation of treatment in the light of the progress the patient had made under the treatment. The patient understood the calamity that had overtaken her and was distressed by it, but was fully cooperative in treatment, and desired only to be made well again. Experience at the clinic showed that it took more than two years.

Tabes Dorsalis.

A patient was then presented with *tabes dorsalis* and Charcot's joint. He was a man, aged seventy-three years, who had been treated for *tabes dorsalis* in 1928; his physical condition was relieved. Since his discharge from treatment, his legs had been weak, but he could get about. He had lived in a shack, and obtained an invalid pension, which he had augmented by doing some cleaning work. A year before his admission to the clinic his legs had become very weak, and pains had appeared; he had to have help to move about and his right knee had a Charcot's deformity. He had become depressed over the recent developments. He felt neglected and said that he had no friends, although he knew a lot of people. His blood pressure was 220 millimetres of mercury, systolic, and 120 millimetres, diastolic, and he had a condition of arteriosclerosis. He was blind in his left eye (optic atrophy). He was shown at the meeting because of the interest attaching to the Charcot's joint, which was due to trophic changes in the bone, ligaments and cartilage, often precipitated by injury. The syphilitic processes led to erosion of the joint cartilage and bone was

absorbed; new bone formed, and effusion occurred, which led to the characteristic picture of a painless swollen joint with a grossly abnormal degree and direction of mobility. There was no treatment for the condition other than to immobilize the joint and apply Scott's dressing. Bed was not to be used for long, owing to the ease with which such patients developed bed sores. The condition was an osteo-arthropathy.

A second patient with *tabes dorsalis*, a man, aged fifty-seven years, had been admitted to the clinic in July, 1950, because of severe depression; he was extremely difficult to manage under home conditions. The story was that four years before he had developed urinary symptoms, of which the first sign was great distension of the bladder. He had several operations for prostatic conditions. Since then he had been sexually impotent, and had had no coitus. He had become very depressed and claimed that the operations had ruined his life. A little later he had a herniotomy performed on a lesion of twenty-seven years' standing, and then he broke down utterly. At that stage he was diagnosed as a tabetic, and was given a course of 14,000,000 units of penicillin. On admission to the clinic he was acutely depressed and retarded and was inclined to be restless and agitated. He exhibited anorexia and insomnia and had no interests. He was so depressed that he was regarded as suicidal. He was overwhelmed by his several misfortunes, and was deeply moved by his impotence. His occupation was that of a newsagent, and he was worried by the inefficiency of his helpers, but his wife managed his affairs. His chief difficulties were loss of libido, difficulty of starting micturition, difficulty in walking and involvement of the limbs. The results of serological tests supported a diagnosis of *tabes dorsalis*. He had arteriosclerosis and a much raised blood pressure. The Argyle-Robertson phenomenon was present in his pupils; they were small, irregular and inactive to light, but active to accommodation. Loss of proprioceptive sense had occurred in both legs. He had a wide-based ataxic gait, and when in the dark he was liable to fall. The ankle and knee jerks and the plantar and cremasteric reflexes were absent; the abdominal reflexes were present and Rombergism was very pronounced. His arms and hands were weakened, and their use was impaired to some degree. The optic nerves were atrophied. He subsequently remained rather depressed and uninterested, and he continued to rail against the evil results of his tabetic illness, with which he was not prepared to effect any compromise; he did not try to get the best out of what remained to him and his former powers. The comment was made that there was no memory of a primary sore or chancre, but he admitted to several attacks of gonorrhœa. Acute retention of urine was frequently the first sign of *tabes dorsalis* or general paralysis of the insane. Association of depression and *tabes dorsalis* was not infrequent, but Kraepelin considered that the commonest form of psychosis seen in the illness was an acute apprehensive restless excitement, often with hallucinations of hearing voices accusing the patient of being a criminal. In cases of tabes with increasing intellectual deterioration, it was certain that the syphilitic process had invaded the cerebral cortex, and then the picture was that of tabo-paresis. Again, the mental changes associated with tabes might be those seen in either paraphrenia or manic-depressive psychosis. The patient had no children, and his wife yielded negative results to serological tests. He had had a second course of penicillin and some malarial rigors, but he still remained depressed and unsettled.

(To be continued.)

Correspondence.

BIBLIOGRAPHY OF DR. BEANEY.

SIR: There are in the Mitchell Library, Sydney, Numbers 1 and 3 of Volume I of *The Medical and Surgical Review (Australasian)*, to which Dr. Craig refers (THE MEDICAL JOURNAL OF AUSTRALIA, December 2, 1950).

Number 3, which appeared in May, 1863, follows the same general plan as Number 1. An editorial deals with the "lunatic asylum", referring particularly to the need for improved accommodation for patients. W. McCrea, M.B. (London), concludes an article on "Treatment of Delirium Tremens and Mania with Tincture of Digitalis" which had apparently appeared in Number 2. The "Social Evil" is discussed by "Scalpel", who favours surveillance of prostitutes. There is no contribution from Dr. Beaney. Fewer advertisements appear, and Baillière's extensive catalogue is not reprinted. The most important feature of the journal is found under the heading of "Medical News"—a verbatim report of the address delivered by Professor Halford at the inauguration of the Medical School of the University of Melbourne on May 1, 1863.

Dr. J. H. L. Cumpston, in the "History of Medical Journalism in Australia", written for the first number of THE MEDICAL JOURNAL OF AUSTRALIA, refers (somewhat inaccurately) to this publication (THE MEDICAL JOURNAL OF AUSTRALIA (1914), Volume I, Number 1, page 15):

> Another medical journal launched about the same time was the "Medical and Surgical Review—Australasian". This was published in Melbourne by F. F. Baillière, but the copies available contain no internal evidence to indicate either the identity of the editor or the society or body which promoted it. It appeared on October 1, 1873, and was published monthly until April, 1875, and consisted largely of articles and memoranda on clinical subjects. Mr. J. G. Beaney appears to have been associated, as a frequent contributor, with this venture. The last reference to this journal that can be found is a mention of its title amongst the list of exchanges of the "New South Wales Medical Gazette" in July, 1874.
>
> A journal having almost the same name, viz., the "Australasian Medical and Surgical Review", was published in 1863, the first number being issued in March of that year, and the last in January, 1864. This short-lived journal appeared monthly, being published by Messrs. Ferguson and Moore, of Melbourne. There is nothing in its pages to indicate who was responsible for its appearance, and as it does not refer to any society or public body, it may be presumed that it was a private venture. The only copy the present writer has seen bears the autograph of Dr. C. E. Reeves, and, in view of Dr. Reeves' known activity in the direction of medical journalism, the suspicion that he may have been the author of this periodical also is justified.

There is an obvious error here—the association of Beaney and Baillière was with the earlier journal (1863-1864) and it was edited by James Keane.

Yours, etc.,

A. M. McINTOSH.

Sydney,
December 13, 1950.

CONGENITAL DEAF-MUTISM, PIGMENTARY DEGENERATION OF THE RETINA, AND AMENTIA.

SIR: I have read with interest the reports of a family of whom members suffered from *retinitis pigmentosa* and deaf-mutism, in which reference is made to supposed lack of amenities for severely deaf children of preschool and school age.

I would suggest that were your correspondent to consult the facilities available at the Royal Alexandra Hospital for Children he would find all aspects of the problems to which he refers are being faced, including instruction in the pre-school years. Further, this is done, as it should be, under medical supervision and not by laymen.

Yours, etc.,

PATRICIA R. DAVY.

Deafness Clinic.
Royal Alexandra Hospital for Children,
Camperdown,
New South Wales.
December 7, 1950.

THE TREATMENT OF SEBACEOUS CYSTS.

SIR: I recently came upon a method of treating sebaceous cysts, which has proved very satisfactory. I thought it would be worth passing on to other practitioners, through your journal.

As you are aware, small sebaceous cysts behind the ear present quite a difficult technical problem for their complete removal. The field is richly supplied with blood vessels, and the removal of a sebaceous cyst is quite a drawn-out procedure and one which requires continuous swabbing to keep the field clear.

Recently, a patient came to see me with a sebaceous cyst about a half-inch in diameter, which he wanted removed straight away. I was very busy at the time and told him it would take almost an hour to remove. I tried to make another appointment for another day, when I felt I would have more time to remove it satisfactorily. He was impatient, however, and wanted it removed that day. Casting my eye around my surgery, I saw my Mark III diathermy machine, and it suddenly occurred to me: why not dispose of the sebaceous cyst with diathermy? Giving my patient a local anæsthetic with "Novocain" (0·5%) and using two cubic centimetres, with a sharp-pointed electrode and a current of 1000 milliamperes, I destroyed the sebaceous cyst in about three or four minutes, without any pain to the patient or effort to myself. The wound healed excellently, and now, six weeks later, is a small linear scar—half an inch long. The result has delighted the patient, and I now have a method of treatment for small sebaceous cysts which is simplicity itself.

Hoping that this method might be of some use to other practitioners, I submit this letter to you.

Yours, etc.,

KEITH J. B. DAVIS.

Cnr. Cook and Moore Park Roads,
Centennial Park,
New South Wales.
December 16, 1950.

THE CONDITIONS OF CIVILIZED LIVING AND THE PROBLEMS OF MENTAL HEALTH.

SIR: The first of the 1950 Beattie-Smith Lectures arrived in the journal this morning. One is inclined to agree with Professor Oeser that psychiatrists in Victoria ought to know more psychology. Perhaps the physicians ought to know more physiology, the surgeons more anatomy, if psychology can be equated with these sciences. But when Professor Oeser praises the psychologists' knowledge of psychiatry at the expense of the psychiatrists' ignorance of psychology, one wonders if he has any knowledge of the scope of psychiatry. Half the total bed state of Victoria, or for that matter of any other State or country, are psychiatric beds. For over fifty years the medical officers of the Department of Mental Hygiene (and to a much lesser extent private psychiatrists) cared for these patients. Private psychiatrists maintained out-patient clinics for the numerous cases on the fringe. Until recent years psychologists had no contact with this material, and one wonders where they derived the knowledge which impresses Professor Oeser. At present it is difficult to understand how much his psychologists know of the eight thousand patients in the State mental hospitals after a few years in his department at the university.

The official classification, either British or American, of psychiatric disorders reveals a majority belonging to the field of general medicine. These have beset humanity since the dawn of history and occur today in varying races and cultures, without any relationship to Professor Oeser's hotch-potch of topical mechanisms, and his zigzag from current needs of housewives to Nazi bestiality. All would wish the professor well with his investigations of group tensions and the ultimate enduring peace, but the field of psychiatry is a well-defined branch of medicine concerned with specific disorders. Thus within the field of criminality, anywhere in the world, psychiatry claims less than 15% in terms of psychopathy, the major psychoses or well-defined psychoneuroses. These are the figures of Holt, in America, and East, in England, while our local gaol medical officer does not differ. If Professor Oeser can deal with the remaining 75%, then the psychiatrists will applaud the transfer of function from the judiciary and penal system. The problem of the psychiatrist in therapeutics is that of the physician. He is ready to utilize the contributions of Freud, Jung, Adler or Professor Oeser in the treatment of his patients, depending on their proven therapeutic worth. He is not ready to apply dicta, even of the great, where these are ventilations of personal deficiencies or speculative philosophies.

Yours, etc.,

BARRY MULVANY,
Lecturer in Psychiatry, Saint Vincent's Hospital Clinical School, Melbourne.

33 Collins Street,
Melbourne, C.1,
December 13, 1950.

Obituary.

GEOFFREY TRAHAIR.

WE are indebted to Dr. Gilbert Phillips for the following account of the career of the late Dr. Geoffrey Trahair.

Dr. Geoffrey Trahair died on November 7, 1950, after a long illness. Geoffrey Trahair had for some years been the leader in the field of electroencephalography in Australia and was personally responsible not only for the development of this special department at the Royal Prince Alfred Hospital, but through his influence and capacity has made this the centre of instruction for medical men from all the States in Australia as well as for the training of electro-encephalographic technicians and recordists. The department will be known as the Geoffrey Trahair Department of Electroencephalography and a suitable plaque will be placed on the wall.

He was born in Melbourne in 1910 and educated at Wesley College and the University of Melbourne. He graduated M.B., B.S. with honours in 1933. During his undergraduate career he developed wide literary interests and was one of the editors of *The Speculum*. He was married in 1932 to Alice Stewart and has left a family of two sons and two daughters. He was a resident medical officer of the Brisbane General Hospital in 1933-1934. Appointed to the Department of Mental Hospitals, New South Wales, in July, 1934, he was stationed at Callan Park for a year before being transferred to Kenmore. Here he began to take a serious interest in photography in which he became particularly skilled and he has left a number of fine photographic records, both of his medical work and more general interests. Subsequently he returned to Callan Park, and during his tenure there "Cardiazol" was first used in Australia and he was the first medical practitioner in New South Wales to produce convulsions by this technique. He gained the diploma of psychological medicine which was conferred in 1940. About this time the first symptoms of a serious intracranial disorder manifested themselves, and from that time until his death he submitted patiently to repeated neurosurgical attention. His fortitude in continuing to develop his knowledge and interest in electrical techniques was unique, and in spite

of serious disabilities he succeeded in organizing and controlling an active and valuable hospital department with which his name will always be associated in the minds of his colleagues. His modesty and insistence on perfection prevented a wider knowledge of his work and attainments.

During 1948, with the assistance of the Rockefeller Foundation and the Royal Prince Alfred Hospital, he toured electroencephalographic centres in England, Canada and America and was subsequently appointed Consultant Editor in Australia for the *International Journal of Electroencephalography*. He was a foundation member and an active contributor to the proceedings of the Sydney Neurological Group.

He was sincere and had a warm personality with a keen sense of humour and a wide range of interests; his death is a real loss to his friends and to medicine in Australia.

MARIO ALBERTO MAYRHOFER.

We are indebted to Dr. Hugh Callagher for the following appreciation of the late Dr. Mario Alberto Mayrhofer.

The recent death of Mario Mayrhofer in Perth, Western Australia, at the early age of fifty-two years, is deeply regretted by a wide circle. Mario's bravery and fortitude on learning the gravity of his affliction were typical of the character of the man, well known to but few of his professional colleagues. Dr. Mayrhofer graduated in Melbourne and, having served as resident medical officer at the Perth Public Hospital, proceeded to Three Springs, Western Australia, approximately twenty-seven years ago. He continued in almost uninterrupted practice in that town throughout his professional life.

Three Springs is the centre for a very large agricultural area, Dr. Mayrhofer's nearest colleague being some hundred miles distant. Whilst never losing sight of his limitations as a practitioner, Dr. Mayrhofer provided an excellent service to his widespread clientele. On many occasions, long journeys, over inferior roads, at the end of a long day's work, were cheerfully undertaken to assist and comfort those in trouble. His invariably cheerful demeanour, together with his readiness at all times to answer the emergency call, irrespective of financial benefit, endeared him to all who resided in his large district. His passing means to all his patients the loss of a dear friend as well as a comforter and healer. He leaves a wife and young family, to whom we extend our most sincere sympathy. We trust that his wife will obtain some consolation in her sorrow by the knowledge that her grief is shared by so many to whom her husband endeared himself by the unselfish devotion to the practice of medicine in its fullest sense. His quiet unassuming manner gave few of his colleagues the opportunity of knowing him at all well. Those of us who did know him grieve the passing of one whose sincerity of purpose and devotion to duty well exemplify the true general practitioner, philosopher, guide and friend.

JOHN EDWIN BATEMAN.

We are indebted to Dr. R. A. Isenstein for the following appreciation of the late Dr. John Edwin Bateman.

The death of John Edwin Bateman has removed from our midst another of those practitioners, the trusted family physicians, whom it is becoming increasingly difficult to replace. He was an unassuming gentleman. He was not very well known to the majority of medical practitioners in South Australia, as he was a native of Sydney and did not commence practice in South Australia until 1936. He was born in Sydney sixty-three years ago, and qualified M.B., Ch.M. at the University of Sydney in 1913. In 1915 he went to Egypt as a medical missionary for the Church Missionary Society and worked at the Old Cairo hospital for natives. There, he gained considerable experience in tropical diseases and general surgery. He did several tours of duty in the Sudan, and in 1917 spent six months at the native hospital at Jaffa as medical officer to the Egyptian Labour Corps. He later became superintendent in charge of the Old Cairo hospital, from which he retired in 1933; but after a period of leave, he returned there for a further twelve months.

Between 1915 and 1933 he paid several visits to England, where his family of two sons and three daughters received most of their education. In 1928 during one of his furloughs back to Australia he obtained the M.D. degree at the University of Sydney. He was elected a foundation Fellow of the Royal Australasian College of Surgeons.

He commenced general practice at Leabrook in 1936 and immediately became popular because of his kindness and consideration for his patients, by all of whom he was held in great affection and high esteem. He was an example of honesty and integrity to his fellow practitioners and to all his patients. The financial side of his practice was a very minor consideration to him. Charity was his main mission in life. During my association with him as a partner for four years he was always cheerful, calm and unruffled. He never had an unkind word to say to or about anyone.

Despite the heavy strain of practice during the war years, he always retained his interest in church affairs, and was a regular attendant at worship. He was an honorary medical officer to the Church Missionary Society and other charitable bodies. He was also an enthusiastic worker for the Student Christian Movement at the university.

For many years he was a clinical assistant at the allergy clinic at the Royal Adelaide Hospital, and during the war years was an honorary anæsthetist at the Adelaide Children's Hospital.

His life was truly one of service and he will be sadly missed.

In 1915 he married Gwendoline Stevens, of Adelaide, who still survives him and was a constant support to him in his missionary activities. Of his five children, his eldest daughter, Mary, served as a physiotherapist with the army overseas during the war, one son, John, was a prisoner of war in Germany, and his youngest son, Peter, who served in the navy during the war, recently qualified as a medical practitioner.

"A Colleague" writes: I would pay my tribute to the memory of my well-beloved friend and colleague of many years, Dr. John E. Bateman, who passed into higher service on November 20, 1950. Bateman was a truly remarkable man, medical missionary, physician and able surgeon. He possessed that triple hall-mark of greatness, modesty, simplicity and sincerity. In all his relations with his fellows one sensed his deep and quiet wisdom, and above all his knowledge of a reverence for that which Swinburne describes as "The Holy Spirit of Man"; something all too often so overgrown with weeds as to be scarcely discernible, but nevertheless an inner sanctity which Bateman never overlooked. To those privileged to have known him, these qualities make imperishable the memory of John Bateman. He was a Christian, who unobtrusively but unswervingly followed in the footsteps of the Master.

JANET LINDSAY GREIG.

We regret to announce the death of Dr. Janet Lindsay Greig, which occurred on October 18, 1950, in England.

JOHN ANTHONY ERNEST ARTHUR LAVERY.

We regret to announce the death of Dr. John Anthony Ernest Arthur Lavery, which occurred on December 7, 1950, at Upper Ferntree Gully, Victoria.

RAYMOND TENNYSON ALLAN.

We regret to announce the death of Dr. Raymond Tennyson Allan, which occurred on December 21, 1950, at Melbourne.

LEO BLAKE.

We regret to announce the death of Dr. Leo Blake, which occurred on December 27, 1950.

LEO FRANCIS CLEARY.

We regret to announce the death of Dr. Leo Francis Cleary, which occurred on January 2, 1951, at Broken Hill, New South Wales.

Post-Graduate Work.

THE MELBOURNE PERMANENT POST-GRADUATE COMMITTEE.

PROGRAMME FOR FEBRUARY.

Classes for Candidates for Higher Degrees and Diplomas.

THE following classes suitable for candidates for higher degrees and diplomas (Part I M.D., M.S., D.O., D.L.O., D.G.O., D.D.R., D.T.R.E., D.A. and D.P.M., and pathology for Part I M.S. and diplomas) will be held at the University of Melbourne.

Monday and Wednesday afternoons: 1.45 p.m., pathology lectures, in the pathology department, for candidates for Part I M.D. and Part II of M.S. and diplomas,[1] commencing March 5, followed by pathology practical demonstrations in the pathology laboratory; 2 p.m., anatomy lectures in the anatomy department for candidates for Part I M.S., D.D.R., D.O., D.L.O., D.G.O., D.T.R.E., D.A. and D.P.M., commencing February 26; 3.45 p.m., physiology lectures in the physiology department for candidates for Part I M.D., M.S., D.O., D.L.O., D.G.O., D.D.R., D.T.R.E., D.A. and D.P.M., commencing on February 26.

Thursdays: 4 p.m. to 6 p.m., physics lectures in the Commonwealth X-ray and Radium Laboratory for candidates for Part I D.D.R. and D.T.R.E., commencing on March 1.

Note: Psychology lectures for candidates for D.P.M. I are arranged by the psychology department of the university and not by the Post-Graduate Committee.

The fees are £31 10s. (total) for courses for Part I of a degree or diploma and £15 15s. for each subject taken separately.

Courses Suitable for Candidates for M.D. II—M.R.A.C.P.

A course in hæmatology, under the direction of Dr. John Bolton, will be held on the following dates at 2 p.m.: February 6, "Introductory Lecture", Dr. J. Bolton, at the Royal Melbourne Hospital. February 8, "Leuchæmia", Dr. John McLean, at the Alfred Hospital. February 13, "Nutritional Anæmia", Dr. John Colebatch, at the Children's Hospital. February 15, "Macrocytic Anæmias", Dr. John Bolton, at the Royal Melbourne Hospital. February 20, "Bleeding Diseases", Dr. John McLean, at the Alfred Hospital. February 27, "Hæmolytic Anæmias", Dr. John Bolton, at the Royal Melbourne Hospital.

The fee for this course is £3 3s., or 10s. 6d. per demonstration.

A course in neurology, under the direction of Dr. E. Graeme Robertson, will be held on the following dates at 4.30 p.m.: February 27 and March 6 and 13, demonstrations by Dr. L. B. Cox at the Alfred Hospital. March 1, 8 and 15, demonstrations by Dr. E. Graeme Robertson in the Main Lecture Theatre, Royal Melbourne Hospital. The fee for this course is £3 3s., or 10s. 6d. per demonstration.

Country Courses.

Week-End Course at Ballarat.

A week-end course will be held at Ballarat on February 17-18, 1951. The programme is as follows: Dr. J. O. Smith, "Surgery of the Kidney and Ureter"; Dr. John Jens, "Diagnosis of Chronic Backache"; Dr. Norman Wettenhall, "Respiratory Diseases of Childhood"; Dr. R. Hooper, "Pain as a Symptom of Peripheral Vascular Disorders".

The fee for this course is £2 2s., or 10s. 6d. per demonstration, and enrolments should be made with the secretary of the Ballarat Subdivision of the British Medical Association, Dr. J. P. L. Griffiths, 29 Errard Street North, Ballarat, telephone 350.

Lecture at Terang.

A lecture will be given at Terang on February 17 by Dr. Russell Howard on "Surgery in Childhood" at 8 p.m. Enrolments should be made with Dr. W. R. Angus, Koroit Street, Warrnambool, telephone 52. The fee is 10s. 6d.

[1] The first half of the pathology course is suitable for candidates for Part II of various diplomas and M.S., and will be supplemented where required by special lectures and demonstrations suitable for the degree or diploma concerned.

Lecture at Flinders Naval Depot.

A lecture will be given at Flinders Naval Depot by Mr. Graeme L. Grove at 2.30 p.m. on February 14, by arrangement with the Royal Australian Navy.

Enrolments.

Enrolments for the courses in the metropolitan area should be made with the Post-Graduate Committee not later than two weeks before the commencement of the course. The committee's address is now 394 Albert Street, East Melbourne, telephone JM 1547-8.

THE POST-GRADUATE COMMITTEE IN MEDICINE IN THE UNIVERSITY OF SYDNEY.

Course for the Diploma in Diagnostic Radiology.

THE Post-Graduate Committee in Medicine in the University of Sydney announces that, provided a sufficient number of candidates is offering, a course for the diploma in diagnostic radiology will begin on March 12, 1951, for a period of twelve months. Arrangements can be made for candidates to be allocated over the full twelve months' period to approved hospitals in order to qualify under the existing diploma regulations. Attendance at the course is required full time over twelve months, unless candidates have already obtained the required experience. Early application is essential, the closing date for enrolment being February 9, 1951. Further details may be obtained on application to the Course Secretary, the Post-Graduate Committee in Medicine, 131 Macquarie Street, Sydney. Telephones: BU 5238, BW 7483. Telegraphic address: "Postgrad Sydney."

Royal Australasian College of Surgeons.

INFORMATION ON EXAMINATIONS FOR FELLOWSHIP.

THE following information on examinations for Fellowship of the Royal Australasian College of Surgeons is published at the request of the Secretary of the College.

1. The diploma of Fellow of the Royal Australasian College of Surgeons may be granted to graduates of an approved medical school who comply with the regulations hereinafter set forth.

2. Candidates for the diploma are required to pass two examinations, namely, a Primary and a Final Examination (provided always that a candidate who has passed the Primary Examination for the diploma of Fellow of the Royal College of Surgeons of England shall be deemed to have passed in the Primary Examination of the Royal Australasian College of Surgeons).

3. Applications for permission to sit for either the Primary or the Final Examination shall be made on the prescribed form and all information required by the Council together with the fee payable for the examination shall be supplied.

4. All inquiries and communications with reference to the diploma of Fellow shall be addressed to the Secretary, Royal Australasian College of Surgeons, Spring Street, Melbourne, C.1, who will supply application forms on request and information concerning the dates of the examinations.

5. Candidates presenting for either examination shall fill in and lodge with the Secretary the prescribed application form at least forty-two days before the examination begins.

6. A candidate withdrawing an application for admission to an examination in writing may receive back the full amount of the fee paid provided that such withdrawal is received before the date on which entries close.

7. A candidate withdrawing an application for admission to an examination on or after the date on which entries close, or who fails to appear for an examination for which his entry has been accepted, may receive back a proportion of the fee paid at the discretion of the Council on production by the candidate, within seven days of the withdrawal or failure to appear at the examination, of medical or other evidence of compassionate grounds satisfactory to the Council.

8. The Council may refuse the application of any candidate for the Primary or Final Examination without assigning reasons.

9. The Council may refuse to proceed with the examination of any candidate who infringes any of the regulations or who is considered by the examiners to be guilty of behaviour prejudicial to the proper management and conduct of the examination or for any other reason.

10. Papers set at the examinations will be printed annually and may be purchased from the Secretary of the College.

11. The Royal Australasian College of Surgeons may conduct appropriate courses of instruction for candidates for both examinations. Particulars are obtainable from the Secretary of the College. The College makes no recommendations as regards text-books.

Primary Examination.

12. Every candidate for admission to the Primary Examination shall be a graduate of not less than one year's standing of an approved medical school.

13. The subjects for the Primary Examination shall be (*a*) anatomy, including normal histology, and (*b*) physiology, including applied physiology and the principles of pathology. The examination shall be partly written and partly oral. Both subjects must be passed at the one examination.

14. The fee payable for admission or readmission to the examination will be determined from time to time by the Council.

Final Examination.

15. All applicants for admission to the Final Examination shall be graduates of not less than three years of an approved medical school and in addition shall have (*a*) completed the Primary or the Primary Fellowship Examination of the Royal College of Surgeons of England; (*b*) undergone one year's training as a resident medical officer in an approved hospital; (*c*) completed a course of surgical training approved by the Censor-in-Chief.

16. The subjects for the Final Examination are (i) the principles of surgery and general pathology and (ii) one of the following: (*a*) general surgery, (*b*) orthopædics, (*c*) gynæcology and operative obstetrics, (*d*) urology, (*e*) ophthalmology, (*g*) laryngo-otology, including in each case the special pathology of the subject.

The examination shall be partly written, partly practical and partly oral, and shall include examination of patients and operative surgery.

17. The fee payable for admission or readmission shall be determined from time to time by the Council.

18. Those candidates who have been approved by a court of examiners for the Final Examination shall forward to the Secretary of the College an application for election as a Fellow by the Council, together with the amount of any entrance fee and the annual subscription. This sum shall be returned to those candidates who are not elected by the Council. The application shall include the necessary pledge.

19. Notwithstanding Clause 2, graduates of an approved medical school who have obtained, prior to December 5, 1948, the first part of the degree of Master of Surgery of an approved medical school or, in the case of ex-servicemen, who have obtained prior to December 5, 1948, any other senior surgical qualification acceptable to the Censor-in-Chief may, at the discretion of the Council, be allowed to proceed to the Final Examination of this College, provided they have fulfilled all other regulations.

Examination in Applied Physiology and the Principles of Pathology.

The examination in applied physiology and the principles of pathology, which is part of the Primary Examination, will be carried out by a written paper and by viva-voce examinations conducted jointly by a physiologist and a pathologist.

The following information is intended to serve as a guide to candidates and indicates the general scope and spirit of the examination.

DISEASES NOTIFIED IN EACH STATE AND TERRITORY OF AUSTRALIA FOR THE WEEK ENDED DECEMBER 16, 1950.[1]

Disease.	New South Wales.	Victoria.	Queensland.	South Australia.	Western Australia.	Tasmania.	Northern Territory.[2]	Australian Capital Territory.	Australia.[3]
Ankylostomiasis	*	1(1)	..	..	..	..	..	..	1
Anthrax	*	..	..	..	..	..	..	..	..
Beriberi	*	*	*	*	*	*	..	*	..
Bilharziasis	*	..	..	..	..	..	..	..	..
Cerebro-spinal Meningitis	..	..	1	..	..	..	..	..	1
Cholera	..	..	..	..	..	..	..	..	..
Coastal Fever(*a*)	*	*	..	*	*	*	*	*	..
Dengue	*	*	*	*	*	*	..	*	..
Diarrhœa (Infantile)	..	..	8(7)	..	..	..	..	..	8
Diphtheria	1(1)	3(2)	2	..	2(1)	..	..	..	8
Dysentery (Amœbic)	*	1	..	..	..	..	..	..	1
Dysentery (Bacillary)	*	..	..	..	..	..	..	4	4
Encephalitis Lethargica	..	..	..	..	..	..	..	..	..
Erysipelas	*	*	*	1	*	*	..	..	1
Filariasis	*	..	..	..	..	..	..	..	..
Helminthiasis	*	..	*	*	*	*	*	*	..
Hydatid	*	..	*	*	..	*	*	..	..
Influenza	*	*	*	..	*	*	..	*	..
Lead Poisoning	*	*	..	..	*	*	*	*	..
Leprosy	..	..	..	..	..	..	..	..	..
Malaria(*b*)	*	..	2(2)	..	..	..	..	..	2
Measles	*	*	*	239(25)	*	*	..	2	241
Plague	..	..	..	..	..	..	..	..	..
Poliomyelitis	42(18)	..	14(1)	15(13)	..	2	*	..	73
Psittacosis	*	..	*	..	*	*	*	*	..
Puerperal Fever	..	..	..	1(1)	1	..	..	..	2
Rubella(*c*)	*	*	..	*	*	*	..	3	3
Scarlet Fever	26(14)	14(5)	20(18)	4(3)	4(3)	..	..	..	68
Smallpox	..	..	..	..	..	..	..	..	..
Tetanus	*	..	..	*	*	*	*	*	..
Trachoma	*	..	*	*	*	*	*	*	..
Tuberculosis(*d*)	20(17)	26(23)	19(4)	15(10)	7(4)	7	..	..	94
Typhoid Fever(*e*)	..	1	1(1)	..	..	1	..	..	3
Typhus (Endemic)(*f*)	..	1(1)	..	..	..	..	..	..	1
Undulant Fever	..	..	..	..	..	..	..	..	..
Weil's Disease(*g*)	*	*	1	*	*	*	*	*	1
Whooping Cough	*	*	*	4(2)	*	*	..	..	4
Yellow Fever	..	..	..	..	..	..	..	..	..

[1] The form of this table is taken from the *Official Year Book of the Commonwealth of Australia*, Number 37, 1946–1947. Figures in parentheses are those for the metropolitan area.

[2] Figures not available.

[3] Figures incomplete owing to absence of returns from the Northern Territory.

* Not notifiable.

(*a*) Includes Mossman and Sarina fevers. (*b*) Mainly relapses among servicemen infected overseas. (*c*) Notifiable disease in Queensland in females aged over fourteen years. (*d*) Includes all forms. (*e*) Includes enteric fever, paratyphoid fevers and other Salmonella infections. (*f*) Includes scrub, murine and tick typhus. (*g*) Includes leptospiroses, Weil's and para-Weil's disease.

Attention will be directed to principles rather than to details. A mastery of the detailed technique of experiments, tests and staining methods will not be demanded; an understanding of the principles involved in the more important methods of laboratory investigation and the interpretation of the results in terms of normal or altered function will be expected.

Synopsis of Subject Matter.

The following is a synopsis of the subject matter.

Growth and its abnormalities. Tumours.

Inflammation and tissue damage. Degeneration, reaction and repair.

Body temperature and fever.

The general principles of infection, resistance and immunity.

Radiosensitivity.

The bacteriology of surgically important infections.

Circulatory system: The normal circulation. Composition and formation of blood and lymph, and the disturbances resulting from injury or disease. Shock and the principles of its treatment.

Respiratory system: Normal respiratory function. Disturbances resulting from injury or disease. The respiratory function of the blood.

Digestive system: The physiology of digestion and its disturbance in injury or disease. The mechanics of the alimentary canal. The effects of obstruction, fistulæ and surgical procedures.

Urinary system: The secretion of urine. The effects of injury or disease. The function and derangement of the bladder. Renal efficiency.

Nervous system: Structure and function of the brain and spinal cord. The effects of injury or disease. Visceral sensation. The cerebro-spinal fluid in health and disease. The peripheral nerves; effects of injury; regeneration. The autonomic nervous system; its derangement in disease and the effects of injury.

Locomotor system: Its normal functions and reactions to injury or disease.

The skin: Its normal functions and reaction to injury.

The endocrine system: The physiology and pathology of the ductless glands and reproductive organs.

Metabolism and nutrition: A general survey of the subject. Vitamins. The influence of diet in surgical disorders.

Pharmacology in relation to surgical practice: Anæsthetics—general and local. Analgesics and hypnotics. Drugs acting on the autonomic nervous system. Chemotherapeutic drugs. The principles of hormone therapy. Diuretics. Aperients.

Honours.

NEW YEAR HONOURS.

HIS MAJESTY THE KING has been pleased to confer the honour of knighthood on Professor Frank Macfarlane Burnet.

Dr. Clifford Craig has been created a Companion of the Most Distinguished Order of Saint Michael and Saint George.

Dr. Lucy Meredith Bryce has been created a Commander, and Dr. John Alexander James and Dr. Allan Robert Stanley Vickers have been created Officers of the Most Excellent Order of the British Empire.

Medical Appointments.

Dr. H. Sutton has been appointed Government Medical Officer at Cloncurry, Queensland.

Dr. R. M. MacIntosh has been appointed honorary clinical assistant to the gynæcological section of the Royal Adelaide Hospital, Adelaide.

Nominations and Elections.

THE undermentioned has applied for election as a member of the New South Wales Branch of the British Medical Association:

Heery, Peter John, M.B., B.S., 1947 (Univ. Sydney), 6 Kareema Street, Balgowlah.

The undermentioned have applied for election as members of the South Australian Branch of the British Medical Association:

Mueller, Merna Alma, M.B., B.S., 1950 (Univ. Adelaide), 2 Talbot Road, Croydon Park Extension.

Rogers, Richard Robsart, M.B., B.S., 1944 (Univ. Sydney), Wudinna.

Miller, Leslie Gordon, M.B., B.S., 1949 (Univ. Adelaide), The Royal Adelaide Hospital, Adelaide.

Rice, John David, M.B., B.S., 1930 (Univ. Adelaide), 157 East Terrace, Adelaide.

The undermentioned has been elected a member of the South Australian Branch of the British Medical Association:

Storey, John Eric McCartney, M.B., B.S., 1942 (Univ. Sydney), 57 Woodville Road, Woodville.

Diary for the Month.

JAN. 16.—New South Wales Branch, B.M.A.: Executive and Finance Committee.
JAN. 18.—Victorian Branch, B.M.A.: Executive Meeting.
JAN. 23.—New South Wales Branch, B.M.A.: Medical Politics Committee.
JAN. 24.—Victorian Branch, B.M.A.: Council Meeting.
JAN. 26.—Queensland Branch, B.M.A.: Council Meeting.

Medical Appointments: Important Notice.

MEDICAL PRACTITIONERS are requested not to apply for any appointment mentioned below without having first communicated with the Honorary Secretary of the Branch concerned, or with the Medical Secretary of the British Medical Association, Tavistock Square, London, W.C.1.

New South Wales Branch (Medical Secretary, 135 Macquarie Street, Sydney)—All contract practice appointments in New South Wales.

Victorian Branch (Honorary Secretary, Medical Society Hall, East Melbourne): Associated Medical Services Limited; all Institutes or Medical Dispensaries; Australian Prudential Association, Proprietary, Limited; Federal Mutual Medical Benefit Society; Mutual National Provident Club; National Provident Association; Hospital or other appointments outside Victoria.

Queensland Branch (Honorary Secretary, B.M.A. House, 225 Wickham Terrace, Brisbane, B17): Brisbane Associated Friendly Societies' Medical Institute; Bundaberg Medical Institute. Members accepting LODGE appointments and those desiring to accept appointments to any COUNTRY HOSPITAL or position outside Australia are advised, in their own interests, to submit a copy of their Agreement to the Council before signing.

South Australian Branch (Honorary Secretary, 178 North Terrace, Adelaide): All Lodge appointments in South Australia; all Contract Practice appointments in South Australia; Medical Officer, South Australian Railways.

Western Australian Branch (Honorary Secretary, 205 Saint George's Terrace, Perth): Norseman Hospital; all Contract Practice appointments in Western Australia. All government appointments with the exception of those of the Department of Public Health.

Editorial Notices.

MANUSCRIPTS forwarded to the office of this journal cannot under any circumstances be returned. Original articles forwarded for publication are understood to be offered to THE MEDICAL JOURNAL OF AUSTRALIA alone, unless the contrary be stated.

All communications should be addressed to the Editor, THE MEDICAL JOURNAL OF AUSTRALIA, The Printing House, Seamer Street, Glebe, New South Wales. (Telephones: MW 2651-2.)

Members and subscribers are requested to notify the Manager, THE MEDICAL JOURNAL OF AUSTRALIA, Seamer Street, Glebe, New South Wales, without delay, of any irregularity in the delivery of this journal. The management cannot accept any responsibility or recognize any claim arising out of non-receipt of journals unless such notification is received within one month.

SUBSCRIPTION RATES.—Medical students and others not receiving THE MEDICAL JOURNAL OF AUSTRALIA in virtue of membership of the Branches of the British Medical Association in the Commonwealth can become subscribers to the journal by applying to the Manager or through the usual agents and booksellers. Subscriptions can commence at the beginning of any quarter and are renewable on December 31. The rate is £3 *per annum* within Australia and the British Commonwealth of Nations, and £4 10s. *per annum* within America and foreign countries, payable in advance.